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MISUMI Corporation

MiSUMi

Standard Components for Plastic Mold

2015

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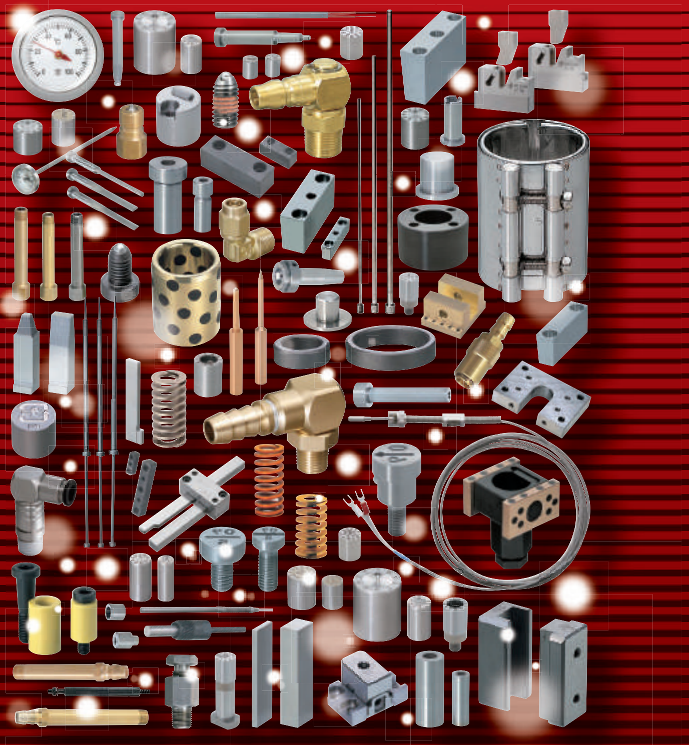
Standard Components for Plastic Mold



2015

MISUMI Corporation

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Lineup of Standard Components for Plastic Mold

Straight Ejector Pins
P.51 ～

Stepped Ejector Pins
P.125 ～

Free Flange-position Ejector Pins
P.173 ～

Rectangular Ejector Pins
P.193 ～

Ejector Sleeves
P.273 ～

Straight Center Pins
P.337 ～

Stepped Center Pins
P.349 ～

Taperless Center Pins
P.379 ～

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P.393 ～

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P.439～

Taperless Core Pins
P.493 ～

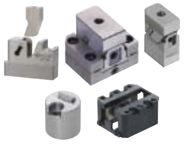
Shaped Inlay Core Pins for Boss
P.519 ～

Block Core Pins/Cavity Inserts
P.541 ～

Steel Plates
Internet

Date Marked Pins · Recycle Marked Pins · Pins with Gas Vent
P.567 ～

Angular Pins · Locking Blocks
P.601 ～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Sprue Bushings · Locating Rings
P.731 ～

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P.825 ～

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P.875 ～

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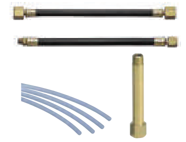
P.925 ～

Components for Ejector Space
P.957 ～

Mold Opening Controllers
P.1009 ～

Couplers/Quick Fitting Joints
P.1043 ～


Joints/Hoses/Cooling Inside of Mold
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Heating Items
P.1139 ～

Heat Insulation Sheet
P.1165 ～

Bolts Screws Washers
P.1183 ～

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Internet

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Components of Large Mold
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Components of Die Casting
P.1277 ～

Components for Injection Molding
Internet

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- **Product Data ／ Technical Data** P.1299 ～
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- **Index** P.1359 ～

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Standard Components for Plastic Mold

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Standard Components for Plastic Mold

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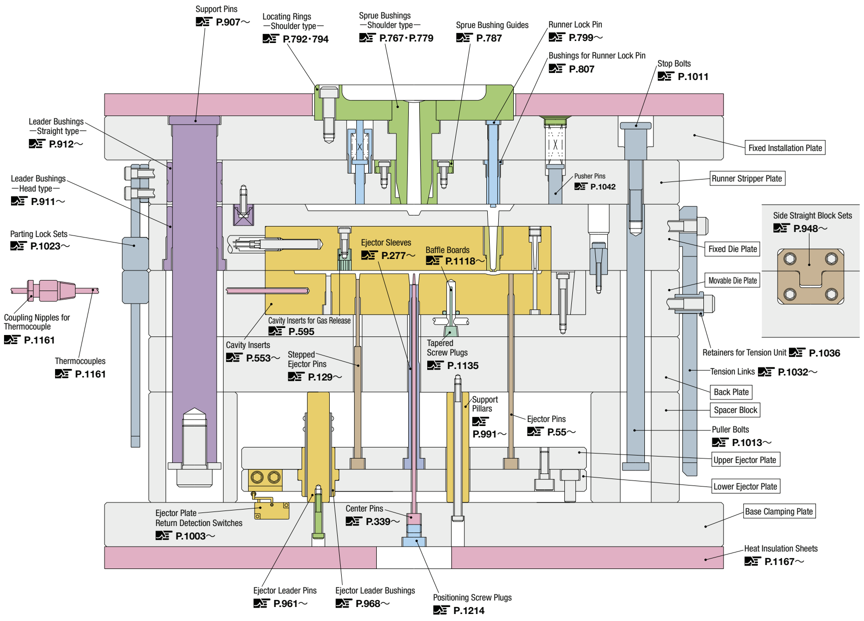
Three-plates Mold Usage example of MISUMI Standard Components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Cavity Inserts for Gas Release P.595
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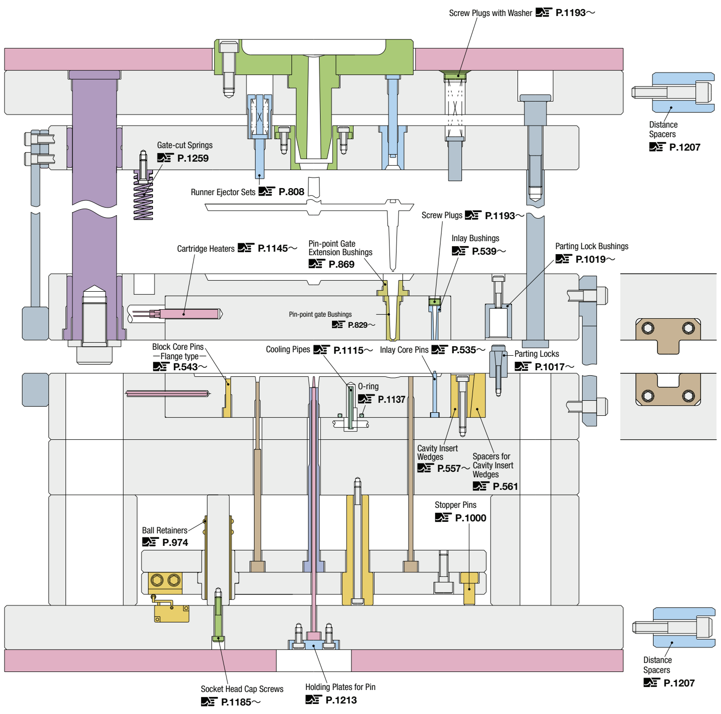
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- 🟦 Ejector Sleeves
- 🟥 Center Pins
- 🟦 Core Pins
- 🟨 Block Core Pins・Cavity Inserts
- 🟩 Components of Gas Release
- 🟦 Angular Pins
- 🟦 Locking Blocks
- 🟥 Slide Cores
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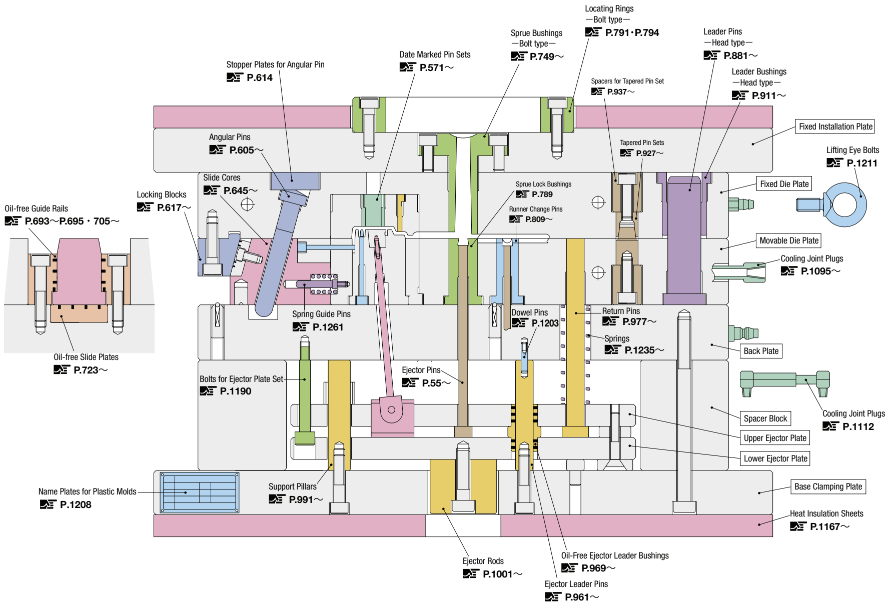
- 🟨 Pin-point gate Bushings
- 🟪 Leader pins・Bushings
- 🟫 Components for Positioning
- 🟨 Ejector Leader pins・Bushings
- 🟨 Return Pins・Support Pillars・Spacer Rings
- ⬜ Mold Opening Controllers
- 🟩 Cooling Items
- 🟥 Heating Items
- 🟩 Bolts・Screws・Washers
- 🟦 Mold Accessories
- 🟪 Coil Springs
- 🟫 Components of Large Mold・Hot Runner

Two-plates Mold Usage example of MISUMI Standard Components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—Bolt type—
P.749～
Locating Rings
—Bolt type—
P.791･P.794
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—Head type—
P.881～
Spacers for Tapered Pin Set
P.937～
Leader Bushings
—Head type—
P.911～
Fixed Installation Plate
Angular Pins
P.605～
Tapered Pin Sets
P.927～
Lifting Eye Bolts
P.1211
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Sprue Lock Bushings
P.789
Fixed Die Plate
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P.617～
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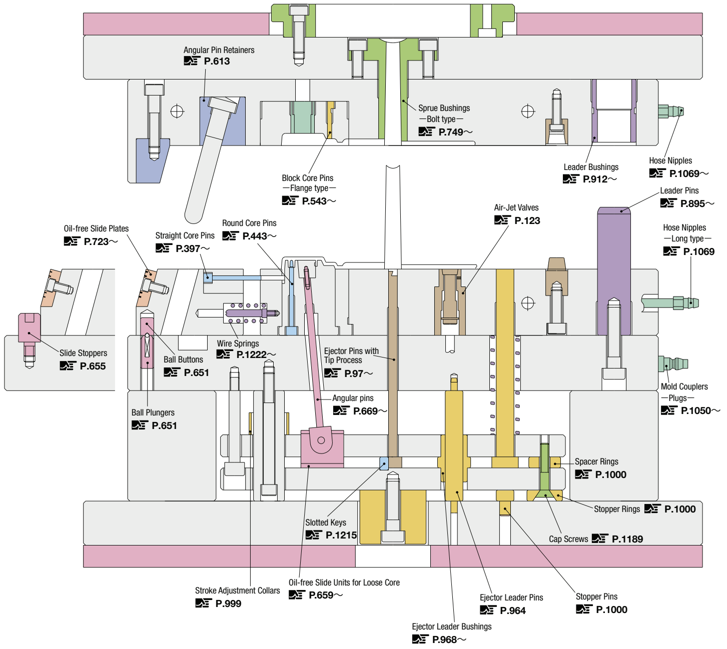
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P.613
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P.123
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P.655
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P.659～
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Ejector Leader Bushings
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🟦 Ejector Sleeves
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🟩 Date Marked Pins
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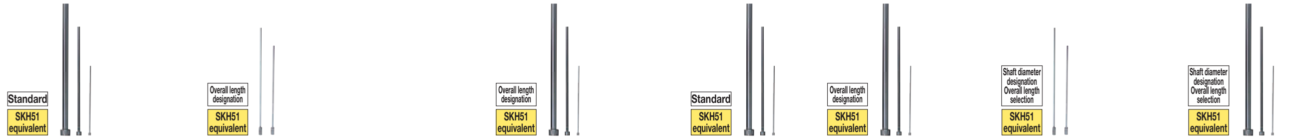
🟦 Mold Opening Controllers
🟩 Cooling Items

STANDARD COMPONENTS FOR PLASTIC MOLD
2015 Contents

How to Use Catalog

- Guide to Marks (P.42)
- How to use Catalog (P.43)
- Stock and Delivery time (P.45)
- Express Service System (P.46)
- Alteration Service (P.45)
- Environmental activities and RoHS Directives (P.46)
- Guide for MISUMI EC service (P.47)

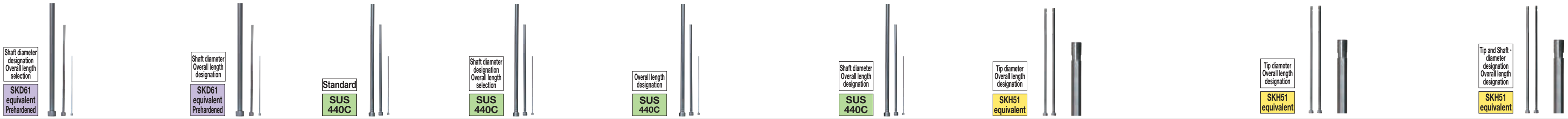
STRAIGHT EJECTOR PINS



Product Name	Part Number	Page	Designation	Material
Straight Ejector Pins—Standard—	EPH	55	Standard	SKH51 equivalent
	EPHE—B	55		
Small Diameter Straight Ejector Pins	EPY—L	57	Overall length designation	SKH51 equivalent
Straight Ejector Pins—L Dimension Designation Type—	EPH—L	57	Overall length designation	SKH51 equivalent
	EPHE—L	57		
—Standard—	EPHJ	59	Standard	SKH51 equivalent
	EPHJE	59		
—L Dimension Designation Type—	EPHJ—L	59	Overall length designation	SKH51 equivalent
	EPHJE—L	59		
Small Diameter Straight Ejector Pins	EPY—G	61	Shaft diameter designation Overall length selection	SKH51 equivalent
Straight Ejector Pins—Shaft diameter designation · L dimension fixed type—	EPH—G	61	Shaft diameter designation Overall length selection	SKH51 equivalent
	EPHE—G	61		

Product Name	Part Number	Page	Designation	Material
—P Dimension Designation · L Dimension Selection Type—	EPHJ—G	61	Shaft diameter designation Overall length selection	SKH51 equivalent
	EPHJE—G	61		
Small Diameter Straight Ejector Pins	EPYB	63	Shaft diameter Overall length designation	SKH51 equivalent
Straight Ejector Pins—L · P dimension designation type—	EPHB	63	Shaft diameter Overall length designation	SKH51 equivalent
	EPHBE	63		
	EPHJB	63	Shaft diameter Overall length designation	SKH51 equivalent
	EPHJBE	63		
Extra Precision Straight Ejector Pins—L dimension designation type—	EPV—L	65	Overall length designation	SKH51 equivalent
—P Dimension Designation · L Dimension Selection Type—	EPV—G	65	Shaft diameter designation Overall length selection	SKH51 equivalent
—L · P Dimension Designation Type—	EPVB	65	Shaft diameter Overall length designation	SKH51 equivalent
Small Diameter Straight Ejector Pins	C—EPYB	67	Shaft diameter Overall length designation	SKH51 equivalent Hard chromate plating
Straight Ejector Pins—L · P dimension designation type—	C—EPHB	67	Shaft diameter Overall length designation	SKH51 equivalent Hard chromate plating
	C—EPHBE	67		
—L · P Dimension Designation Type—	C—EPHJB	67	Shaft diameter Overall length designation	SKH51 equivalent Hard chromate plating
	C—EPHJBE	67		

Product Name	Part Number	Page	Designation	Material
—Standard—	EPN	69	Standard	SKD61 equivalent Nitrided
	EPJ	69		
—L Dimension Designation Type—	EPN—L	71	Overall length designation	SKD61 equivalent Nitrided
	EPJ—L	71		
—P Dimension Designation · L Dimension Selection Type—	EPNG	73	Shaft diameter designation Overall length selection	SKD61 equivalent Nitrided
	EPJG	73		
—L · P Dimension Designation Type—	EPNB	75	Shaft diameter Overall length designation	SKD61 equivalent Nitrided
	EPJB	75		
—Standard—	EPDS	77	Standard	SKD61 equivalent
	EPD	77		
—P Dimension Designation · L Dimension Selection Type—	EPDGS	77	Shaft diameter designation Overall length selection	SKD61 equivalent
	EPDG	77		
—L Dimension Designation Type—	EPDS—L	79	Overall length designation	SKD61 equivalent
	EPD—L	79		
—L · P Dimension Designation Type—	EPDBS	79	Shaft diameter Overall length designation	SKD61 equivalent
	EPDB	79		
—Standard—	EPAJ	81	Standard	SKD61 equivalent Prehardened
—L Dimension Designation Type—	EPAJ—L	81	Overall length designation	SKD61 equivalent Prehardened



Product Name	Part Number	Page	Designation	Material
—P Dimension Designation · L Dimension Selection Type—	EPAJG	81	Shaft diameter designation Overall length selection	SKD61 equivalent Prehardened
—L · P Dimension Designation Type—	EPAJB	81	Shaft diameter Overall length designation	SKD61 equivalent Prehardened
—Standard type—	EPW	83	Standard	SUS 440C
	EPWJ	83		
—P Dimension Designation · L Dimension Selection Type—	EPWG	83	Shaft diameter designation Overall length selection	SUS 440C
	EPWJG	83		
—L Dimension Designation Type—	EPW—L	83	Overall length designation	SUS 440C
	EPWJ—L	83		
—L · P Dimension Designation Type—	EPWB	83	Shaft diameter Overall length designation	SUS 440C
	EPWJB	83		
Straight Ejector Pins with Gas Vent—L · PC dimension designation type/L · P · PC dimension designation type—	GVB—EPH—L	85	Tip diameter Overall length designation	SKH51 equivalent
	GVB—EPHE—L	85		
Straight Ejector Pins with Gas Vent—L · PC dimension designation type/L · P · PC dimension designation type—	GVB—EPHJ—L	85	Tip diameter Overall length designation	SKH51 equivalent
	GVB—EPHJE—L	85		
—L · P · PC Dimension Designation Type—	GVB—EPHB	85	Tip and Shaft · diameter designation Overall length designation	SKH51 equivalent
	GVB—EPHBE	85		

Product Name	Part Number	Page	Designation	Material
—L · P · PC Dimension Designation Type—	GVB—EPHJB	85	Tip and Shaft · diameter designation Overall length designation	SKH51 equivalent
	GVB—EPHJBE	85		
—L Dimension Designation Type—	GV—EPH—L	87	Overall length designation	SKH51 equivalent
	GV—EPHE—L	87		
—L Dimension Designation Type—	GV—EPHJ—L	87	Overall length designation	SKH51 equivalent
	GV—EPHJE—L	87		
—L · P Dimension Designation Type—	GV—EPHB	87	Shaft diameter Overall length designation	SKH51 equivalent
	GV—EPHBE	87		
—L · P Dimension Designation Type—	GV—EPHJB	87	Shaft diameter Overall length designation	SKH51 equivalent
	GV—EPHJBE	87		
Straight Ejector Pins with Gas Vent—Cutting facets／L dimension designation type—	GW□—EPH—L	89	Cutting facets Overall length designation	SKH51 equivalent
	GW□—EPHE—L	89		
	GW□—EPHJ—L	89	Cutting facets Overall length designation	SKH51 equivalent
	GW□—EPHJE—L	89		
Straight Ejector Pins with Gas Vent—Cutting facets／L · P dimension designation type—	GW□—EPHB	89	Cutting facets Overall length · designation	SKH51 equivalent
	GW□—EPHBE	89		
	GW□—EPHJB	89	Cutting facets Overall length · designation	SKH51 equivalent
	GW□—EPH—JBE	89		

Product Name	Part Number	Page	Designation	Material
Ejector Pins with Z Groove Processed—L dimension designation type—	Z—EPH—L	91	Z Groove processed Overall length designation	SKH51 equivalent
	Z—EPHE—L	91		
Straight Ejector Pins with Tip Process—L dimension designation type—	EPH□A	97	Overall length designation	SKH51 equivalent
	EPHE□A	97		
	EPHJ□A	97	Overall length designation	SKH51 equivalent
	EPHJE□A	97		
—L · P Dimension Designation Type—	EPHB□A	99	Shaft diameter Overall length designation	SKH51 equivalent
	EPHBE□A	99		
	EPHJB□A	99	Shaft diameter Overall length designation	SKH51 equivalent
	EPHJBE□A	99		
—L Dimension Designation Type—	EPN□A	101	Overall length designation	SKD61 equivalent Nitrided
	EPJ□A	101		
—L · P Dimension Designation Type—	EPNB□A	103	Shaft diameter Overall length designation	SKD61 equivalent Nitrided
	EPJB□A	103		
—L Dimension Designation Type—	EPDS□A	105	Overall length designation	SKD61 equivalent
	EPD□A	105		
—L · P Dimension Designation Type—	EPDBS□A	107	Shaft diameter Overall length designation	SKD61 equivalent
	EPDB□A	107		

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Overall length designation
SKH51 equivalent

Overall length designation
SKH51 equivalent

Straight Ejector Pins with Engraving—L Dimension Designation Type—
EPH□M EPH□MR EPHE□M EPHE□MR 109
EPHJ□M EPHJ□MR EPHJE□M EPHJE□MR 109

Shaft diameter Overall length designation
SKH51 equivalent

—L・P Dimension Designation Type—
EPHB□M EPHB□MR EPHBE□M EPHBE□MR
111

Shaft diameter Overall length designation
SKH51 equivalent

—L・P Dimension Designation Type—
EPHJB□M EPHJB□MR EPHJBE□M EPHJBE□MR
111

Overall length designation
SKH51 equivalent

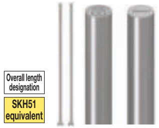
Extra Precision Straight Ejector Pins with Engraving—L dimension designation type—
EPV□M EPV□MR
113

Shaft diameter Overall length designation
SKH51 equivalent

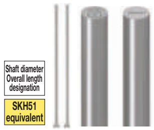
—L・P Dimension Designation Type—
EPVB□M EPVB□MR
113

Overall length designation
SKD61 equivalent Nitrided

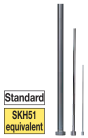
Straight Ejector Pins with Engraving—L Dimension Designation Type—
EPN□M EPN□MR EPJ□M EPJ□MR
115


Overall length designation
SKH51 equivalent

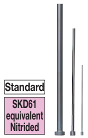
—L dimension designation・convex character type—
EPH□T EPHE□T
117 117


Shaft diameter Overall length designation
SKH51 equivalent

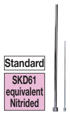
—L・P dimension designation・convex character type—
EPHB□T EPHBE□T
117 117


Standard
SKH51 equivalent

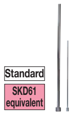
Straight Ejector Pins —Standard type—
48・100PACK—EPH 48・100PACK—EPHE
119


Standard
SKD61 equivalent Nitrided

—Standard type—
48・100PACK—EPN
119


Standard
SKD61 equivalent Nitrided

—Standard type—
48・100PACK—EPJ
119


Standard
SKD61 equivalent

—Standard type—
48・100PACK—EPD
119

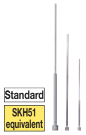
PINS FOR EJECTOR BLOCK
EBPJ
121

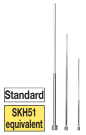
Air-Jet Valves
AJVE AJV
123 123

Spacers for Air-jet Valve
AJVS
124

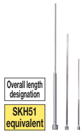
Spring Pins & Dowel Pins
WSP MS
124 124

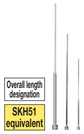
Stepped Ejector Pins


Standard
SKH51 equivalent

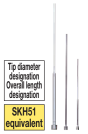

Standard
SKH51 equivalent

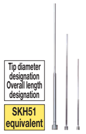
Product Name Part Number
Stepped Ejector Pins—Standard—
EHS EHSE EHSJ EHSJE
Page 129 129


Overall length designation
SKH51 equivalent

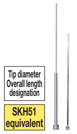

Overall length designation
SKH51 equivalent

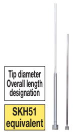
—L Dimension Designation Type—
EHSL EHSEL EHSJL EHSJEL
131 131 131 131

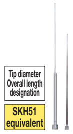

Tip diameter designation Overall length designation
SKH51 equivalent


Tip diameter designation Overall length designation
SKH51 equivalent

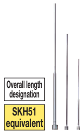
—P・N dimension designation・L dimension selection type—
EHSG EHSEG EHSJG EHSJEG
133 133 133 133


Tip diameter Overall length designation
SKH51 equivalent

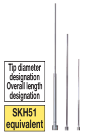

Tip diameter Overall length designation
SKH51 equivalent


Tip diameter Overall length designation
SKH51 equivalent

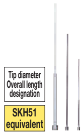
—L・P・N DIMENSION DESIGNATION TYPE—
EHYF EHSF EHSFE EHSJF EHSJFE
135 135 135 135 135


Overall length designation
SKH51 equivalent

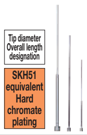
Extra Precision Stepped Ejector Pins—L dimension designation type—
EVSL
137

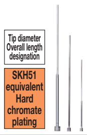

Tip diameter designation Overall length designation
SKH51 equivalent

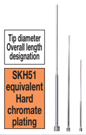
—P・N dimension designation・L dimension selection type—
EVSG
137


Tip diameter Overall length designation
SKH51 equivalent

—L・P・N DIMENSION DESIGNATION TYPE—
EVSF
137


Tip diameter Overall length designation
SKH51 equivalent Hard chromate plating


Tip diameter Overall length designation
SKH51 equivalent Hard chromate plating


Tip diameter Overall length designation
SKH51 equivalent Hard chromate plating

—L・P・N DIMENSION DESIGNATION TYPE—
C—EHYF C—EHSF C—EHSFE C—EHSJF C—EHSJFE
139 139 139 139 139

Overall length designation
SKH51 equivalent

Stepped Ejector Pins with Gas Vent—L dimension designation type—
GVB—EHSL GVB—EHSJL GVB—EHSEL GVB—EHSJEL
141 141 141 141

Tip diameter Overall length designation
SKH51 equivalent

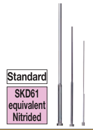
—TIP DIAMETER・L・P・N DIMENSION DESIGNATION TYPE—
GVB—EHSF GVB—EHSJF GVB—EHSFE GVB—EHSJFE
143 143 143 143

Cutting facets Overall length designation
SKH51 equivalent

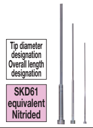
—Cutting facets/L dimension designation type—
GW□—EHSL GW□—EHSJL GW□—EHSEL GW□—EHSJEL
145 145 145 145

Cutting facets Shaft diameter designation Overall length designation
SKH51 equivalent

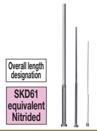
—Cutting facets/L・P N dimension designation type—
GW□—EHSF GW□—EHSJF GW□—EHSFE GW□—EHSJFE
147 147 147 147


Standard
SKD61 equivalent Nitrided

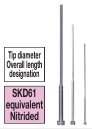
—Standard—
ENS EJS
149 149


Tip diameter designation Overall length designation
SKD61 equivalent Nitrided

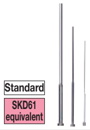
—P・N dimension designation・L dimension selection type—
ENSG EJSG
149 149


Overall length designation
SKD61 equivalent Nitrided

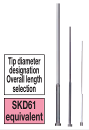
—L Dimension Designation Type—
ENSL EJSL
151 151


Tip diameter Overall length designation
SKD61 equivalent Nitrided

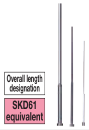
—L・P・N Dimension designation type—
ENSF EJSF
151 151


Standard
SKD61 equivalent

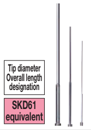
—Standard—
EDS EDSE
153 153


Tip diameter designation Overall length selection
SKD61 equivalent

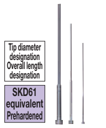
—P・N dimension designation・L dimension selection type—
EDSG EDSEG
153 153


Overall length designation
SKD61 equivalent

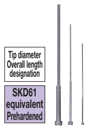
—L Dimension Designation Type—
EDSL EDSEL
155 155


Tip diameter Overall length designation
SKD61 equivalent

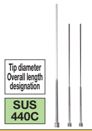
—L・P・N DIMENSION DESIGNATION TYPE—
EDSFS EDSF
155 155


Tip diameter designation Overall length designation
SKD61 equivalent Prehardened

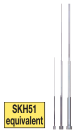
—P・N dimension designation・L dimension selection type—
EASG
157


Tip diameter Overall length designation
SKD61 equivalent Prehardened

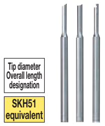
—L・P・N DIMENSION DESIGNATION TYPE—
EASF EAJSF
157 157

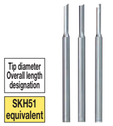

Tip diameter Overall length designation
SUS 440C

—L・P・N DIMENSION DESIGNATION TYPE—
EWSF EWSJF
159 159


SKH51 equivalent

Two-Stepped Ejector Pins
EHWSB
161


Tip diameter Overall length designation
SKH51 equivalent


Tip diameter Overall length designation
SKH51 equivalent

Stepped Ejector Pins with Tip Process—L・P・N dimension designation type—
EHSF□A EHSFE□A EHSJF□A EHSJFE□A
167 167 167 167

Tip diameter Overall length designation
SKH51 equivalent

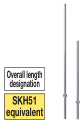
Tip diameter Overall length designation
SKH51 equivalent

Stepped Ejector Pins with Engraving—L・P・N dimension designation type—
EHSF□M EHSF□MR EHSFE□M EHSFE□MR EHSJF□M EHSJF□MR EHSJFE□M EHSJFE□MR
169 169 169 169

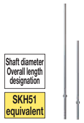
Tip diameter Overall length designation
SKD61 equivalent Nitrided

Stepped Ejector Pins with Engraving—L・P・N dimension designation type—
EJSF□M EJSF□MR
171

FREE FLANGE POSITION EJECTOR PINS


Overall length designation
SKH51 equivalent

Product Name Part Number
Free Flange Position Straight Ejector Pins-L dimension designation type-
EPSH EPSHE
Page 175 175


Shaft diameter Overall length designation
SKH51 equivalent

—L・P Dimension Designation Type—
EPSHB EPSHBE
175 175

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—L Dimension Designation Type—	EPSN	177	Overall length designation	SKD61 equivalent
—L・P Dimension Designation Type—	EPSNB	177	Shaft diameter Overall length designation	SKD61 equivalent
Stepped Ejector Pins with Free Flange Position	EPSHS	179	Overall length designation	SKH51 equivalent
	EPSHSE	179		
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	EPSHE□A	185		
—L・P Dimension Designation Type—	EPSHB□A	185	Shaft diameter Overall length designation	SKH51 equivalent
	EPSHBE□A	185		
Free Flange Position Stepped Ejector Pins with Tip Process—L・P・N Dimension Designation Type—	EPSHS□A	187	Tip diameter Overall length designation	SKH51 equivalent
	EPSHSE□A	187		
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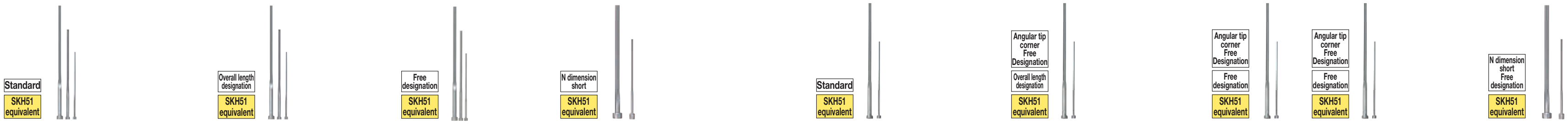
Pusher Pins with Spring Guide	EPCH	191		SKH51 equivalent
	EPCHE	191		

RECTANGULAR EJECTOR PINS



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—L Dimension Designation Type—	ERL	199	Overall length designation	SKH51 equivalent
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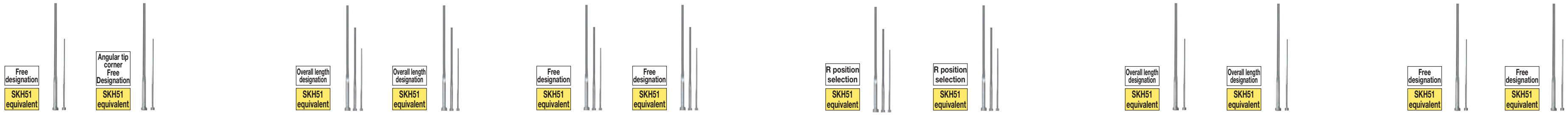
—Free designation type—	ERF	201	Free designation	SKH51 equivalent
	ERJF	201		
—N dimension short type—	ERSF	203	N dimension short	SKH51 equivalent
	ERSJF	203		
Precision Rectangular Ejector Pins—Standard—	ERVB	205	Standard	SKH51 equivalent
	ERVJB	205		
—L Dimension Designation Type—	ERVL	207	Angular tip corner Free Designation Overall length designation	SKH51 equivalent
	P—ERVL	207		
	ERVJL	207		
—Free designation type—	ERVYF	209	Angular tip corner Free Designation Free designation	SKH51 equivalent
	P—ERVYF	209		
	ERVF	209	Angular tip corner Free Designation Free designation	SKH51 equivalent
	P—ERVF	209		
	ERVJ	209		
—N dimension short type—	ERVSF	211	N dimension short Free designation	SKH51 equivalent
	ERVSJF	211		



Extra Precision Rectangular Ejector Pins—Free designation type—	ERZF	213	Free designation	SKH51 equivalent
	P—ERZF	213	Angular tip corner Free Designation	SKH51 equivalent
R-chamfered rectangular Ejector pins—L dimension designation type—	ERLWR	215	Overall length designation	SKH51 equivalent
	ERLFR	215	Overall length designation	SKH51 equivalent
—Free designation type—	ERWR	217	Free designation	SKH51 equivalent
	ERFR	217		
	ERJWR	217	Free designation	SKH51 equivalent
	ERJFR	217		
—Free designation・R position selection type—	ER□□R・ER□R	219	R position selection	SKH51 equivalent
	ERJ□□R・ERJ□R	219	R position selection	SKH51 equivalent
R-chamfered Precision Rectangular Ejector Pins—L dimension designation type—	ERVLWR	221	Overall length designation	SKH51 equivalent
	ERVLFR	221	Overall length designation	SKH51 equivalent
—Free designation type—	ERVWR	223	Free designation	SKH51 equivalent
	ERVFR	223		
	ERVJWR	223	Free designation	SKH51 equivalent
	ERVJFR	223		

—Free designation・R position selection type—	ERV□□R・ERV□R	225	Free designation R position selection	SKH51 equivalent
	ERVJ□□R・ERVJ□R	225	Free designation R position selection	SKH51 equivalent
C-chamfered Rectangular Ejector Pins—Free designation type—	ERF□□C	227	Free designation	SKH51 equivalent
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	GV—ERVJ	233		
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	ERJ□R□□	239		
Precision Rectangular Ejector Pins with Tip Process	ERV□□	241	Free designation	SKH51 equivalent
	ERVJ□□	241		

Precision R-Chamfered Rectangular Ejector Pins with Tip Processed	ERV□R□□	243	Free designation	SKH51 equivalent
	ERVJ□R□□	243		
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R-Chamfered Rectangular Ejector Pins with Engraving	ER□R□M	247	Free designation	SKH51 equivalent
	ER□R□MR	247		
Precision Rectangular Ejector Pins with Engraving	ERVF□M ERVF□MR	249	Free designation	SKH51 equivalent
Precision R-Chamfered Rectangular Ejector Pins with Engraving	ERV□R□M	251	Free designation	SKH51 equivalent
	ERV□R□MR	251		
Rectangular Ejector Pins for Large Mold—Standard—	ERJXB	253	Standard	SKH51 equivalent
—L Dimension Designation Type—	ERJXL	253	Overall length designation	SKH51 equivalent
—Free designation type—	ERJX	255	Free designation	SKH51 equivalent
R-chamfered Rectangular Ejector Pins for Large Mold	ERJXWR	257	Free designation	SKH51 equivalent
	ERJXFR	257		

Rectangular Ejector Pins for Large Mold—Standard—	ERNXB	259	Standard	SKD61 equivalent Nitrided
—L Dimension Designation Type—	ERNXL	259	Overall length designation	SKD61 equivalent Nitrided
—Free designation type—	ERNX	261	Free designation	SKD61 equivalent Nitrided
R-chamfered Rectangular Ejector Pins for Large Mold—Free designation type—	ERNXWR	263	Free designation	SKD61 equivalent Nitrided
	ERNXFR	263		
Rectangular Ejector Pins for Large Mold—Caulking・standard／Caulking・L dimension designation type—	ERHK—B	265	Caulking Blank	SKH51 equivalent
	ERHK—L	265	Caulking Overall length designation	SKH51 equivalent
—CAULKING・FREE DESIGNATION TYPE—	ERHK—F	267	Caulking Free designation	SKH51 equivalent
Rectangular Ejector Blanks for Large Mold	ERKB	268		SKH51 equivalent
PRECISION RECTANGULAR EJECTOR PINS—RECTANGULAR SHANK TYPE—	ERSRP	269	Rectangular shank	SKH51 equivalent
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	ERDPJ	271		
	ERDFJ	271		

STANDARD COMPONENTS FOR PLASTIC MOLD
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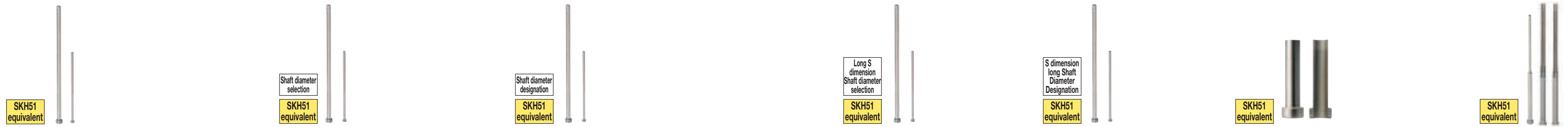
EJECTOR SLEEVES



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Shaft diameter designation SKH51 equivalent	—Shaft diameter designation type—	ESVB ESVJB ESVB—H ESVB—M	279 279 279 279
Long S dimension Shaft diameter selection SKH51 equivalent	—Long S dimension · Shaft diameter selection type—	ESVK—H ESVKJ—H ESVK—M	281 281 279
S dimension long Shaft Diameter Designation SKH51 equivalent	—Long S dimension · Shaft diameter designation type—	ESVKB—H ESVKJB—H ESVKB—M	281 281 281
SKH51 equivalent	Short Ejector Sleeves—Relief tapered Type—	EPBBH EPBB—H EPBB—M	283 283 283
SKH51 equivalent	Precision Small Diameter · Thin-wall Stepped Ejector Sleeve—Tapered Type—	ESVFX	285

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D dimension selection D dimension designation SKH51 equivalent	Precision Stepped Ejector Sleeves—D selection · D designation type—	ESV□□ ESVJ□□ ESV□□—H ESV□□—M	289 289 289 289
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S dimension long D dimension selection D dimension designation SKH51 equivalent	—Precision · Long S dimension／D selection · D designation type—	ESVK□□—H ESVKJ□□—H ESVK□□—M	293 293 293
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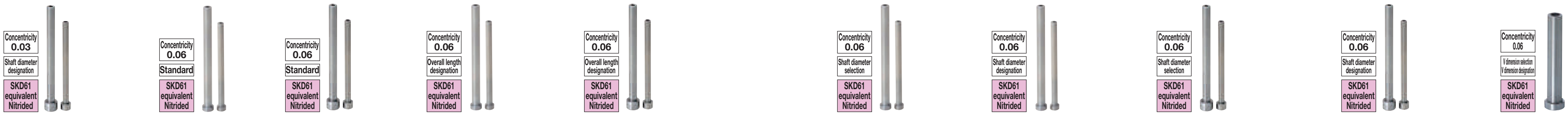
Concentricity 0.03 Shaft diameter selection SKD61 equivalent Nitrided	—Shaft Diameter (D) Selection Type—	ESNV—L	299
Concentricity 0.03 Shaft diameter designation SKD61 equivalent Nitrided	—Shaft diameter (P) designation (0.01mm increments) type—	ESNVB	299
Concentricity 0.03 Shaft diameter selection SKD61 equivalent Nitrided	—JIS head Shaft diameter (D) selection type—	ESNVJ	301



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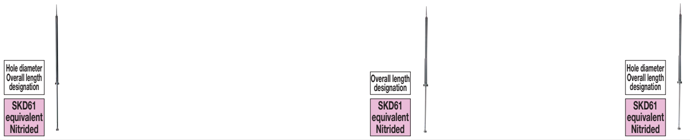
Concentricity 0.06 Standard SKD61 equivalent Nitrided	—JIS head Standard—	ESJ	305
Concentricity 0.06 Overall length designation SKD61 equivalent Nitrided	—L Dimension Designation Type—	ESN—LC	307
Concentricity 0.06 Overall length designation SKD61 equivalent Nitrided	—JIS head L dimension designation type—	ESJL	309
Concentricity 0.06 Shaft diameter selection SKD61 equivalent Nitrided	—Shaft diameter selection type—	ESN—L	311
Concentricity 0.06 Shaft diameter designation SKD61 equivalent Nitrided	—Shaft diameter designation type—	ESNB	311
Concentricity 0.06 Shaft diameter selection SKD61 equivalent Nitrided	—JIS head Shaft diameter selection type—	ESNJ	313
Concentricity 0.06 Shaft diameter designation SKD61 equivalent Nitrided	—JIS head Shaft diameter designation type—	ESJB	313
Concentricity 0.06 V dimension selection V dimension designation SKD61 equivalent Nitrided	Short Ejector Sleeves	ECB ECBB	315 315

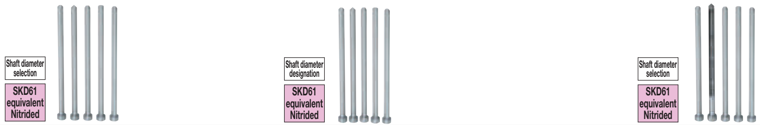
	Product Name	Part Number	Page
Concentricity 0.03 SKD61 equivalent Nitrided	Stepped Ejector Sleeve	ESNVF	317
Concentricity 0.03 SKD61 equivalent Nitrided	—JIS head—	ESJVF	317
Concentricity 0.06 Standard SKD61 equivalent Nitrided	—Standard—	ESNFT	319
Concentricity 0.06 Standard SKD61 equivalent Nitrided	—JIS head Standard—	ESJFT	319
Concentricity 0.06 Overall length designation SKD61 equivalent Nitrided	—L Dimension Designation Type—	ESNF—LC	321
Concentricity 0.06 Overall length designation SKD61 equivalent Nitrided	—JIS head L dimension designation type—	ESJF—LC	321
Concentricity 0.06 Free designation SKD61 equivalent Nitrided	—L · V dimension designation type—	ESNF	323
Concentricity 0.06 Free designation SKD61 equivalent Nitrided	—JIS head L · V dimension designation type—	ESJF	325
Overall length designation SKH51 equivalent	Straight Ejector Sleeve & One-Step Center Pin Sets	ESV—S—□	327
Overall length designation SKD61 equivalent Nitrided	—L Dimension Designation Type—	ESNS—□ ESJS—□	329 329



	Product Name	Part Number	Page
Hole diameter Overall length designation SKD61 equivalent Nitrided	Straight Ejector Sleeve&One-Step Center Pin Sets—Hole (Shaft) diameter · L dimension designation type—	ESNP—□ ESJP—□	331 331
Overall length designation SKD61 equivalent Nitrided	Stepped Ejector Sleeve&One-Step Center Pin Sets—L dimension designation type—	ESNM—□ ESJM—□	333 333
Hole diameter Overall length designation SKD61 equivalent Nitrided	—L · V DIMENSION DESIGNATION TYPE—	ESND—□ ESJD—□	335 335

STRAIGHT CENTER PINS

	Product Name	Part Number	Page
Shaft diameter selection SKH51 equivalent	Straight Center Pins with Tip Process—Shaft diameter (D) selection type—	CPH—5L□ CPHJ—5L□ CPHE—5L□ CPHJE—5L□	339 339 339 339
Shaft diameter designation SKH51 equivalent	—Shaft diameter (P) designation (0.01mm increments) type—	CPHG—5L□ CPHJG—5L□ CPHGE—5L□ CPHJGE—5L□	341 341 341 341



	Product Name	Part Number	Page
Shaft diameter selection SKD61 equivalent Nitrided	—Shaft Diameter (D) Selection Type—	CPN—5L□ CPJ—5L□	343 343
Shaft diameter designation SKD61 equivalent Nitrided	Straight center pins with tip process—Shaft diameter (P) designation (0.1mm increments) type—	CPNG—5L□ CPJG—5L□	345 345
Shaft diameter selection SKD61 equivalent Nitrided	Straight Center Pins with Tip Process Cooling Hole—Shaft diameter (D) selection type—	RDCPN—5L□ RDCPJ—5L□	347 347

STEPPED CENTER PINS

	Product Name	Part Number	Page
Shaft diameter selection SKH51 equivalent	One-step Center Pins —Shaft diameter (D) selection type—	CP□—5□ CP□J—5□ CP□E—5□ CP□JE—5□	353 353 355 355
Shaft diameter designation SKH51 equivalent	—Shaft diameter (P) designation (0.01mm increments) type—	CP□G—5□ CP□JG—5□ CP□GE—5□ CP□JGE—5□	357 357 359 359
Shaft diameter selection SKD61 equivalent Nitrided	—Shaft diameter (D) selection type—	CPN□—5□ CPJ□—5□	361 361

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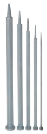
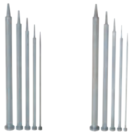

Shaft diameter designation
SKD61 equivalent Nitrided

Shaft diameter selection
SKD61 equivalent Nitrided


Shaft diameter selection
SKD61 equivalent

Shaft diameter designation
SKD61 equivalent

Shaft diameter selection
SKH51 equivalent

Shaft diameter designation
SKH51 equivalent

Shaft diameter designation
SKD61 equivalent Nitrided

Shaft diameter designation
SKH51 equivalent

Product Name	Part Number	Page
—Shaft diameter (P) designation (0.1mm increments) type—	CPN□G—5□	363
	CPJ□G—5□	363
One-step Center Pins with Cooling Hole—Shaft diameter (D) selection type—	RDCPN—5□	365
	RDCPJ—5□	365
One-step Center Pins —Shaft diameter (D) selection type—	CPP—5□	367
	CPD—5□	367
	CPDK—5□	367
—Shaft diameter (P) designation (0.01mm increments) type—	CPPG—5□	369
	CPDG—5□	369
	CPDKG—5□	369
Two-step Center Pins	C□H5□	371
	C□HE5□	371
Precision Stepped One-step Center Pins	CP□B—5□	373
	CP□BJ—5□	373
Stepped One-Step Center Pins	CPNB—5□	375
	CPJB—5□	375
Stepped Two-step Center Pins	C□HB5□	377

TAPERLESS CENTER PINS

Shaft diameter selection
SKH51 equivalent

Shaft diameter selection
SKH51 equivalent

Shaft diameter designation
SKH51 equivalent

Shaft diameter designation
SKH51 equivalent

Shaft diameter selection

Shaft diameter designation
SKD61 equivalent Nitrided

Shaft diameter selection
SKD61 equivalent Nitrided

Product Name	Part Number	Page
Taperless One-step Center Pins—Shaft diameter (D) fixed tip (A) type—	CP□S—5□	383
	CP□SJ—5□	383
	CP□SE—5□	383
	CP□SJE—5□	383
—Shaft diameter (P) designation (0.01mm increments) type—	CP□SG—5□	385
	CP□SJG—5□	385
	CP□SGE—5□	385
	CP□SJGE—5□	385
—Shaft diameter (D) fixed tip (A) type—	CPNS—5□	387
	CPJS—5□	387
—Shaft diameter (P) designation (0.1mm increments) type—	CPNSG—5□	389
	CPJSG—5□	389
Taperless One-step Center Pins with Cooling Hole	RDCPNS—5□	391
	RDCPJS—5□	391

STRAIGHT CORE PINS

Shaft Diameter Selection Overall length designation
Precision
Standard

Shaft Diameter Selection Overall length designation
Extra precision

Shaft diameter Overall length designation
Precision
Standard

Shaft diameter Overall length designation
Extra precision

Shaft diameter designation Overall length selection

Shaft Diameter Selection Shaft Diameter Designation Overall length selection
Standard

Shaft Diameter Selection Shaft Diameter Designation
Standard

Shaft Diameter Selection Shaft Diameter Designation
Precision

Shaft Diameter Selection Shaft Diameter Designation
Standard

Product Name	Part Number	Page
Straight Core Pins—Shaft diameter (D) selection・L dimension designation type—	CP□—L	397
	CPM—L	397
—Shaft diameter (P) designation・L dimension designation type—	CP□B—L	399
	CPMB—L	399
—Shaft diameter (P) designation (0.01mm increments)・L dimension selection type—	CP□—G	401
—Shaft diameter (D) selection / shaft diameter (P) designation・L dimension designation・Shaft diameter tolerance / type—	CP□—L CP□B—L	403
	CP□—L CP□□B—L	405
Gas Release Straight Core Pins with Cutting facets	GW—CP□—L GWS—CP□—L	407
	GW—CP□B—L GWS—CP□B—L	407
Gas Release Straight Core Pins	GV—CP□—L GV—CP□B—L	409

Shaft Diameter Selection Shaft Diameter Designation
Precision

Shaft Diameter Selection Shaft Diameter Designation
Extra precision

Shaft diameter selection
Shaft diameter designation
Standard

Shaft diameter selection
Shaft diameter designation
Standard

Shaft diameter selection
Shaft diameter designation

Shaft diameter selection
Shaft diameter designation
Precision

Shaft diameter selection
Shaft diameter designation
Extra precision

Product Name	Part Number	Page
Precision Gas Release Straight Core Pins	GV—CP□—L GV—CP□B—L	411
Extra Precision Gas Release Straight Core Pins	GV—CPM—L	413
	GV—CPMB—L	413
Straight core pins with tip process Shaft diameter tolerance $^{-0.01}_{-0.02}$	—Shaft diameter (D) selection type—	415
	—Shaft diameter (P) designation type—	417
Straight core pins with tip process Shaft diameter tolerance $^{-0}_{-0.005}$	—Shaft diameter (D) selection type—	415
	—Shaft diameter (P) designation type—	417
Straight Core Pins with Tip Process	CPH□G CPH1Z CPH□R CPHB□G CPHB1Z CPHB□R	419
Precision straight core pins with tip process	—Shaft diameter (D) selection type—	421
	—Shaft diameter (P) designation type—	421
Extra precision straight core pins with tip process	—Shaft diameter (D) selection type—	423
	—Shaft diameter (P) designation type—	423

Shaft Diameter Selection Shaft Diameter Designation Overall length selection
Standard

Shaft diameter selection
Shaft diameter designation
Standard

Free designation
Standard

Shaft diameter selection
Shaft diameter designation

Shaft diameter selection
Shaft diameter designation

Shaft diameter selection

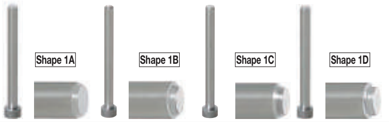
Shaft diameter designation

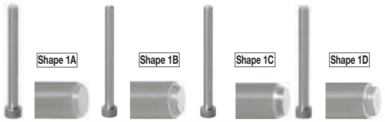
Product Name	Part Number	Page
Straight core pins—JIS head—	CPDJ—L	425
	CPDJB—L	425
Straight core pins with tip process—JIS head—	—Shaft diameter (D) selection type—	427
	—Shaft diameter (P) designation type—	427
Free designation straight core pins with tip process	F—CP□□	429
	F—CP□E□	429
Straight Core Pins With Engraving —Concave Character Type—	CPH□M CPX□M CPHB□M CPXB□M	431
Sequential Numbering Destination Straight Core Pins With Engraving —Concave character type—	CP□1MR CP□B1MR	433
Straight Core Pins With Engraving —Convex character type—	CPH□T	435
	CPX□T	435
	CPHB□T	435
	CPXB□T	435
Core Pin Blanks	CPD	437
	CPH	437

STEPS-TYPE・ROUND CORE PINS

Shaft diameter selection
Shaft diameter designation
Standard

Shaft diameter selection
Shaft diameter designation
Standard


Shaft diameter selection
Shaft diameter designation
Standard
Shape 1A
Shape 1B
Shape 1C
Shape 1D


Shaft diameter selection
Shaft diameter designation
Standard
Shape 1A
Shape 1B
Shape 1C
Shape 1D

Product Name	Part Number	Page
One-step Core Pins・Shaft diameter tolerance $^{-0.01}_{-0.02}$	—Shaft diameter (D) selection type—	443
	—Shaft diameter (P) designation type—	445
One-step Core Pins・Shaft diameter tolerance $^{-0}_{-0.005}$	—Shaft diameter (D) selection type—	443
	—Shaft diameter (P) designation type—	445
TIP (ℓ) Short One-step Core Pins・Shaft diameter tolerance $^{-0.01}_{-0.02}$	—Shaft diameter (D) selection type—	447
	—Shaft diameter (P) designation type—	447
TIP (ℓ) Short One-step Core Pins・Shaft diameter tolerance $^{-0}_{-0.005}$	—Shaft diameter (D) selection type—	447
	—Shaft diameter (P) designation type—	447

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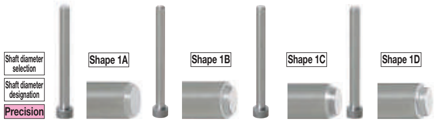
Shaft diameter selection
Shaft diameter designation
Precision

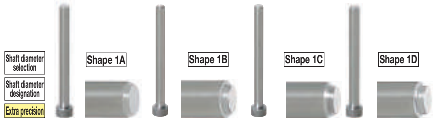
Precision One-Step Core Pins
—Shaft diameter (D) selection type— 449
—Shaft diameter (P) designation type— 451


Shaft diameter selection
Shaft diameter designation
Precision
Shape 1A
Shape 1B
Shape 1C
Shape 1D

Precision Short Tip (ℓ) One-Step Core Pins
—Shaft diameter (D) selection type— 453
—Shaft diameter (P) designation type— 453

Shaft diameter selection
Shaft diameter designation
Extra precision

Extra Precision One-step Core Pins
—Shaft diameter (D) selection type— 455
—Shaft diameter (P) designation type— 457


Shaft diameter selection
Shaft diameter designation
Extra precision
Shape 1A
Shape 1B
Shape 1C
Shape 1D

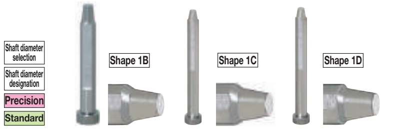
Extra Precision Short Tip (ℓ) One-step Core Pins
—Shaft diameter (D) selection type— 459
—Shaft diameter (P) designation type— 459

Shaft diameter selection
Shaft diameter designation
Standard

One-Step Core Pins—Tip lapped · Shaft diameter tolerance $^{-0.01}_{-0.02}$ —
—Shaft diameter (D) selection type— 461
—Shaft diameter (P) designation type— 463

Shaft diameter selection
Shaft diameter designation
Standard

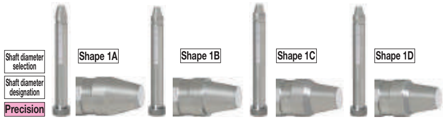
One-Step Core Pins—Tip lapped · Shaft diameter tolerance $^{0}_{-0.005}$ —
—Shaft diameter (D) selection type— 461
—Shaft diameter (P) designation type— 463


Shaft diameter selection
Shaft diameter designation
Precision
Standard
Shape 1B
Shape 1C
Shape 1D

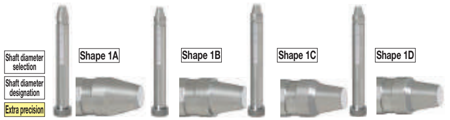
Gas Release One-Step Core Pins with Cutting Facets
—Shaft diameter (D) selection type— 465
—Shaft diameter (P) designation type— 465

Shaft diameter selection
Shaft diameter designation
Standard
Shape 1A
Shape 1B
Shape 1C
Shape 1D

Gas Release One-step Core Pins
—Shaft diameter (D) selection type— 467
—Shaft diameter (P) designation type— 469


Shaft diameter selection
Shaft diameter designation
Precision
Shape 1A
Shape 1B
Shape 1C
Shape 1D

Precision Gas Release One-Step Core Pins
—Shaft diameter (D) selection type— 471
—Shaft diameter (P) designation (0.005mm increments) type— 471


Shaft diameter selection
Shaft diameter designation
Extra precision
Shape 1A
Shape 1B
Shape 1C
Shape 1D

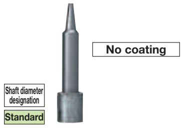
Extra Precision Gas Release One-Step Core Pins
—Shaft diameter (D) selection type— 473
—Shaft diameter (P) designation (0.001mm increments) type— 473

Shaft diameter selection
Shaft diameter designation
Standard

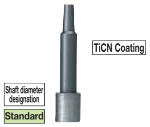
One-step Core Pins—JIS head · Shaft diameter tolerance $^{-0.01}_{-0.02}$ —
—Shaft diameter (D) selection type— 475
—Shaft diameter (P) designation (0.01mm increments) type— 475

TiCN Coating
Shaft diameter designation
Standard

Coated One-step Core Pins—TiCN coating—
H—CPDB1□□ 477


No coating
Shaft diameter designation
Standard

Free Specified One-step Core Pins—No coating—
F—CP□B1□□ 479


TiCN Coating
Shaft diameter designation
Standard

—TiCN coating—
HF—CPDB1□□ 479

Shaft diameter selection
Standard

Two-step Core Pins—Shaft Diameter (D) Selection Type—
—Shaft diameter tolerance $^{-0.01}_{-0.02}$ — 481
—Shaft diameter tolerance $^{0}_{-0.005}$ — 483

Shaft diameter designation
Standard

Two-step Core Pins—Shaft Diameter (D) Designation Type—
—Shaft diameter tolerance $^{-0.01}_{-0.02}$ — 485
—Shaft diameter tolerance $^{0}_{-0.005}$ — 487

Shaft diameter selection
Precision

Precision Two-Step Core Pins
—Shaft diameter (D) selection type— 489

Shaft diameter designation
Precision

Precision Two-Step Core Pins
—Shaft diameter (P) designation type— 491

TAPERLESS CORE PINS

Product Name
Part Number
Page

Shaft diameter selection
Shaft diameter designation
Standard

Taperless One-step Core Pins
—Shaft diameter (D) selection type— 497
—Shaft diameter (P) designation type— 499

Shaft diameter selection
Shaft diameter designation
Precision

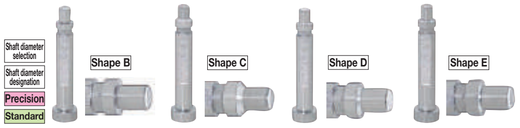
Precision Taperless One-step Core Pins
—Shaft diameter (D) selection type— 501
—Shaft diameter (P) designation type— 503

Shaft diameter selection
Shaft diameter designation
Extra precision

Extra Precision Taperless One-Step Core Pins
—Shaft diameter (D) selection type— 505
—Shaft diameter (P) designation type— 507

Shaft diameter selection
Shaft diameter designation
Standard

Taperless One-Step Core Pins—Lapped—
—Shaft diameter (D) selection type— 509
—Shaft diameter (P) designation type— 509


Shaft diameter selection
Shaft diameter designation
Precision
Standard
Shape B
Shape C
Shape D
Shape E

Gas Release Taperless One-Step Core Pins
—Shaft diameter (D) selection type— 511
—Shaft diameter (P) designation type— 513

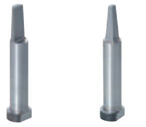
Shaft diameter selection
Shaft diameter designation
Precision

Precision Taperless Two-step Core Pins
—Shaft diameter (D) selection type— 515
—Shaft diameter (P) designation type— 517

Round Core Pins for Boss · Shaped Core Pins -Round Shank Type- · Round Core Pins -Inlay Type-

Product Name
Part Number
Page

Large-diameter Straight Core Pins—Shaft diameter (D) selection · Shaft diameter (P) designation—
GCMN GCMK GCMX GCMBN GCMBK GCMBX 521



Round Shank Core Pins Shape B Shape C Shape D
CPD—□□ CPP—□□ CPH—□□ CPV—□□ 523

Round Core Pins for Boss—Shaft diameter (D) selection · Shaft diameter (P) designation—
BC□S—□□ BC□BS—□□ 525

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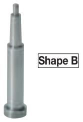
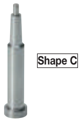
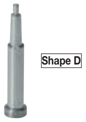






Round Core Pins for Boss—Gas release hole type—
□GV—BC□S—□□ GV—BC□BS—□□
527

Straight Core Sleeves—S dimension Designation type—
CS□K□4T CS□K□ CS□KB□4T CS□KB□
529

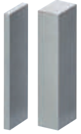
—S dimension Fixed type—
CS□□4T CS□□ CS□B□4T CS□B□
531

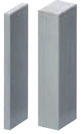
Core Pins for Shaft Holes
CPS□□ CPSB□□
533

CP□—2A CP□B—2A CP□—2B CP□B—2B
Inlay Core Pins—Shaft diameter (D) selection type—
535

CP□—2C CP□B—2C CP□—2D CP□B—2D CP□—2E CP□B—2E
Inlay Core Pins—Shaft diameter (P) designation type—
537

BLOCK CORE PINS CAVITY INSERTS





Inlay Bushings—Head type—
IRHB
539

—Straight Type—
IRB
540

Product Name
Part Number
Page

Block Core Pins—Straight type—
SPHD 543
BCSS□ 543
BCSSX 543

—Flange type—
BCS□ 543
BCSX 543

R-chamfered Block Core Pins—Straight type—
SPHD—□□R BCSSN—□□R
544

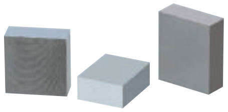
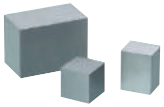
—Flange type—
BCSH—□□R BCSN—□□R
544

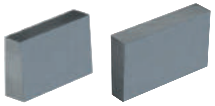
Block Core Pins with Tip Process
BCS□□A BCS□□B
545

Block Core Pins with Engraving
BCSH□□ BCSN□□
547

Block Core Pins—Wide type—
BCSW□ 549
BCSWS 549

Hardened Plates for Core—Top & bottom 2-faces grinded type—
HPSHW HPHEW HPSWW
550



—6-faces grinded type—
HPS□ HP□E
551

Cavity Insert Block Blanks
No reference plane type 553
／Reference plane type (4 faces grinded, 2 faces milled) 553

Cavity Insert Blocks (6 faces-grinded)
Standard 555
Precision 555

Cavity Insert Wedges—Tapered type—
ICS 557
ICH 557

—Bolt hole position free type—
ICSM 559
ICHM 559

Cavity Insert Wedge Spacers
ICSS 561
ICHS 561
IUSS 561
IUHS 561

Cavity Insert Wedges—Parallel type—
IPS
563

STEEL PLATES

Product Name
Part Number
Page

Ground plates for wedm —Standard・Thickness (T) 0.01mm increments designation type—
S50CWP・T—S50CWP

High-precision ground plates —Free size type—
NAK55HP・NAK55MP
NAK80HP・NAK80MP

Internet

Ground plates for wedm —Standard・Thickness (T) 0.01mm increments designation type—
STAVAXWP・T—STAVAXWP
PX5WP・T—PX5WP
DH2FWP・T—DH2FWP
SKD11WP・T—SKD11WP

Internet

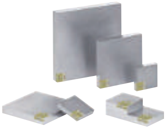
Ground plates —Standard・Free size type—
S50CSP・F—S50CSP
NAK55SP・F—NAK55SP
NAK80SP・F—NAK80SP

Internet

Ground plates —Standard・Free size type—
STAVAXSP・F—STAVAXSP
PX5SP・F—PX5SP

Milled plates —Standard・Free size type—
S50CFP・F—S50CFP
NAK55FP・F—NAK55FP
NAK80FP・F—NAK80FP

Internet



Milled plates —Standard・Free size type—
STAVAXFP・F—STAVAXFP
PX5FP・F—PX5FP
DH2FFP・F—DH2FFP
SKD11FP・F—SKD11FP

Finished plates —Standard・Free size type—
S50CRP・F—S50CRP

Internet

Finished plates —Standard・Free size type—
NAK55RP・F—NAK55RP
NAK80RP・F—NAK80RP
SKD11RP・F—SKD11RP

Plates with water hole and・or heater hole—Free size type—
M—S50CFP・M—S50CRP・M—S50CSP

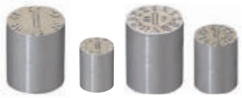
Internet

Internet catalog is not available in some subsidiaries.

STANDARD COMPONENTS FOR PLASTIC MOLD
2015 Contents

DATE MARKED PINS
RECYCLE MARKED PINS
PINS WITH GAS VENT

Product Name	Date Marked Pin Sets—PL exchange type—	Inside Arrows for PL Exchange Type	Outside Rings for PL Exchange Type	Date Marked Pin Sets—Plate-side exchange type—	Inside Arrows for Plate-side Exchange Type	Outside Rings for Plate-side Exchange Type
Part Number	DTBX DTBXU DTX DTXU DTXS DTXSU DT□X DT□XU DTMBX DTX□M	DYYXDYYXUDNXDNXU DYMX	DTX—RDT□X—RDTXS—R DTX—R□M	DTAA DTAAU DTBB DTBBU DT DTU DTS DTSU DT□ DT□U DTM□ DT□M	DYY DYYU DN DNU DYM	DT—R DTS—R DT□—R DT—R□M
Page	571	573	574	575	577	578



Date Marked Pin Sets—PL Exchange・Outer Corner Tapered Type—			Date Marked Pin Sets—Plate-side Exchange・Outer Corner Tapered Type—			Date Marked Pin Sets—Convex Character Type—	Date Marked Pin Sets—Double Ring Type—	Screwdriver for Date Marked Pin Sets	Date Marked Pin Sets—L adjustable type—
DT□□□T	DT□□—RT	DTX—RT□M	DT□□□T	DT□—RT	DT—RT□M	DT□□C DT□□—RC DYY□□ DN□□	DTBZ DTEZ	DTPPN	DTBXL DT□XL CPWDT—L
579	580	580	581	582	582	583・584	586	586	589

—Inside Arrow・Character Designation Type—	—Outside Ring・Character Designation Type—	—Outside Rings for L Adjustable type—	Recycle Marked Pins for Identification of Plastic Packaging	Recycle Marked Pins	Gas Vents	Cavity Inserts for Gas Release—Round shape—	Vacuum Unit	Gas Vent Units	Spacer for Gas Vent Unit		Gas Release Assist Units (Vacuum Generator)
DTMBXL	DTXL□M	DT□XL—R DTXL—R□M	RMP□M	RM□□	TSV□	BGVS	AVBN	MSTV	MSTVS	MSTVM	M—VCL
590	590	591	593	593	594	595	596	597	598	598	599

ANGULAR PINS
LOCKING
BLOCKS

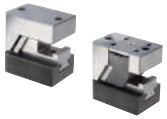
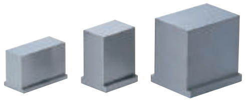
Product Name	Angular Pins		—Economy type—		—Tapped type—				—Male screw type—		Angular Pins —Cap bolt type—		Angular Pin Retainers		Screw Bolts for Angular Pin	Stopper Plates for Angular Pin	Angular Cams	
Part Number	AP	APS	APZ	APSZ	APU	APUS	APHX	APHXS	APM	APMS	APX	APXS	APRS□	APRW□	AI	APP	ANCE	ANC
Page	605	605	607	607	609		609		611	611	611	611	613	613	614	614	615	615

Positioning Locking Blocks—Plain type—		—Oil groove type—	—Oil free type—	—Angle (G) designation・Inlay part 4mm type—		—Angle (G) designation・Inlay part 8・10mm type—		—Width (A)・Angle (G) designation・Inlay part 4mm type—		Positioning Locking Blocks—Free designation type—	—with Beveled Bottom—
LBCSK	LBCMK	LBCSM	LBCSZ	LBCS	LBCM	LBCSH	LBCMH	LBCSF	LBCMF	LBC□I	LBCST
617	617	617	617	619	619	619	619	621	621	623	624

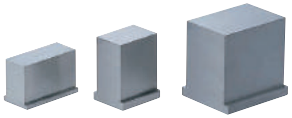
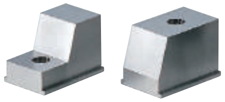
Locking Blocks—Inlay type・Inlay part (E)・Angle (G) designation—			—Inlay・PL installation type—		Locking Blocks with Angular Hole Process —For PL installation・Width space saving type—	Locking Blocks with Angular Hole Process—For PL installation・Width space saving・High precision type—	Locking Blocks with Angular Holes	—PL installation type—
LBMS	LBMM	LBMD	LBPS	LBPM	ABPXE	ABPX	ALBMS	ALBPS
625	625	625	627	627	628	628	629	630

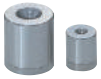
STANDARD COMPONENTS FOR PLASTIC MOLD
2015 Contents

SLIDE CORES LOOSE CORES

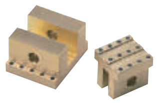
Product Name Part Number	Mini Slide Core Units MSCN□	—Inlay part processed— MSCK□	—Tapped— MSCM□	—Slim type・Inlay part processed— MSCSG	—Slim type・Tapped— MSCSGM	—Slim type with slide core retracting mechanism／Inlay part・Tapped— MSCSB	MSCSBM	Slide core units for two-color injection mold SCTM	Slide Core Units For Two-color Injection Mold Slide Stroke Amount 6mm SCWM□	Slide Cores—Standard type— SLG□K	SLG□A
Page	634	634	634	637	637	638・639・640	638・639・640	642	643	645	645



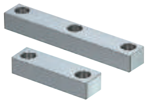
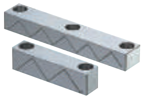
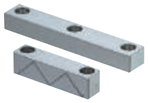
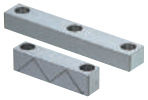
Slide Cores—Free designation type— SLF□K	SLF□A	Slide Cores with Angular Hole SLFK□A(X・Y・Z)	Ball Plungers BPJ BSJ BSZ BSX	Ball Buttons BBT	Ball Plunger Wrenches BPJG	Ball Plungers—Cap type— BPCT	Slide Locks SLLK	Ball Plungers—Plain type— BSZP	Ball Plungers—Head type— BSJT
645	645	647	651	651	651	652	653	654	654

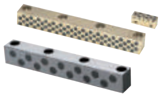
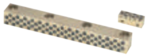
Slide Stoppers SLSP	Slide Core Stop Blocks SLNB	Oil-free Slide Units for Loose Core—Standard・Fixing type— SCZN	—Standard・Adjusting type— SCZA	Oil-free Slide Inclined Pin Holders for Loose Core SCZNP	SCZAP	Oil-free Slide Units for Loose Core SCY	Oil-free Slide Inclined Pin Holders for Loose Core—selection type— KSCNP	Inclined pins・Direct push-up pins K—KSPSA KSPSA	K—KSPSB KSPSB	K—KSPSC KSPSC	K—KSPSD	—Male Thread type— K—KSPSE KSPSE	Inclined Pin Leader Oil-free Bushings KPBZ	MPBZ
655	656	659	661	663	663	665	667	669	669	671	671	673	675	675



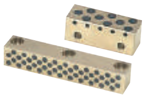
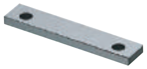
Oil-free Slide Blocks for Block Loose Core SCK
676

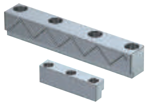
GUIDE RAILS CENTER RAILS

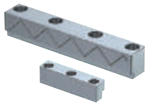





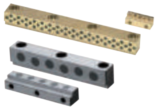



Product Name Part Number	Plain Guide Rails—Non-oil groove type— GRS	GRM	—Oil groove type— GRSM	GRMM	—L dimension designation type— GRSF—□H GRSFM—□H GRMF—□H GRMFM—□H	—Free designation type— FGRS—□H FGRSM—□H FGRM—□H FGRMM—□H	—Nitriding type Non-oil Groove・Oil Groove— GRMT GRMMT	Oil-free Plain Guide Rails—Standard (Copper Alloy・SKS3)— GRZ GRSZ	—Bolt hole pitch designation type— GRZF—□H
Page	685	685	685	685	687	689	691	693	694

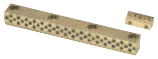
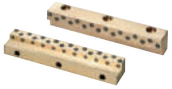



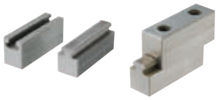






Oil-free Plain Guide Rails—Heat resistant 120° type— GRHZ	Plate Guide Rails GRPT GRPTC	Single-heel Guide Rails—Standard (Groove 5・8・15mm)— GR5□C GR5□ GR8□ GR15□	Single-heel Guide Rails—Standard Oil Groove (Groove 5・8・15mm)— GR5□CM GR5□M GR8□M GR15□M	—L dimension designation Non-oil Groove・Oil Groove (Groove 5・8mm)— GR5SF□□—□H GR8SF□—□H GR5MF□□—□H GR8MF□—□H	—Free designation type Non-oil Groove・Oil Groove— FGR□—□H FGR□M—□H	—Nitriding type Non-oil Groove・Oil Groove— GR□MT GR□MMT	Oil-free Single Heel Guide Rails —Standard (Groove 5mm)— GR5Z GR5SZ	—Standard (Groove 8mm)— GR8Z GR8SZ
695	696	697	697	699	701	703	705	706



Oil-free Single Heel Guide Rails—Bolt hole pitch designation (Groove 5・8mm)— GR5ZF—□H	GR8ZF—□H	—Standard (Groove 15mm)— GR15Z	—Dowel hole type— SRTL	Single-heel Guide Rails—V dimension standard (Groove 5・8mm)— GR5□V GR8□V	Double Heel Guide Rails—Free designation type— FGTSF□M FGTMF□M	Guide Rail—Ant heel type— GRAZF	GRAZM	Center Rails—Standard— CGS CGSM CGM	—L dimension designation— CGRS CGRSM CGRM	—Free designation type— FCGS□M FCGM□M
707	708	709	710	711	712	713	713	715	716	717

STANDARD COMPONENTS FOR PLASTIC MOLD
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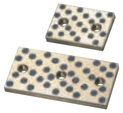
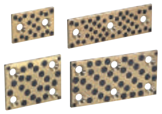
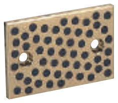
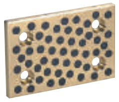
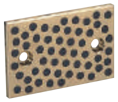




Oil-free Center Rails—Standard type—	—Bolt hole pitch designation type—	Slide Adjustment Plates Non-oil Groove · Oil Groove	Oil-free Slide Adjustment Plates	Slide Adjustment Plates—Free designation type Non-oil Groove · Oil Groove—	Oil-free Thin Slide Plates	—SKS3 (53～56HRC) 5mm type—	Oil-free Slide Plates	—Copper alloy 10mm · 4-bolt type—	Oil-free Slide Plate—SKS3 (53～56HRC) 10mm type—	Compact Oil-free Slide Plates
CGZ	CGZF—□H	SAS SAP SASM SAMM	SAPZ	SAP□□H SAP□M□H	—Copper alloy 5mm type—UTW	UTWSZ	—Copper alloy 10mm · 2-bolt type—STW · STWT	STW	STWSZ	—Copper alloy 10mm type—STS
719	720	721	721	722	723	724	725	725	726	726



Oil-free Slide Plate Plates Thickness Plus Tolerance type	Oil-free Slide Plates	Oil-free Slide Plates	—Copper alloy 20mm, 4-bolt type—	Shims for Oil-free Slide Plates
—Copper alloy 10mm · Plate thickness plus tolerance type— PSLP	—Copper alloy 10mm · Heat resistant 150° type—HPSLP	—Copper alloy 20mm, 2-bolt type—SEW · SEWT	SEW	SMP
727	728	729	729	730

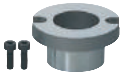
SPRUE BUSHINGS LOCATING RINGS

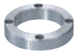
Product Name	Ecology Sprue Bushings Normal Bolt Type—Flange thickness 10mm · Straight—	—Flange thickness 10mm · Tapered—	Ecology Sprue Bushings Shoulder Type—Straight—	—Tapered—
Part Number	SBBPE SBBKE	SBGPE SBGKE	SBSME SBSDE	SBTME SBTDE
Page	743 743	743 743	745 745	745 745

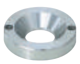
Sprue Bushings Normal Bolt Type—Bolt fixing type／flanged type—	—Flange thickness 10mm · Straight—	—Flange thickness 10mm · Tapered—	String Eliminator Sprue Bushings—Board Thickness Selection Type—	Sprue Bushings Bolt Fixing Type—(Old) JIS A · straight—	Sprue Bushings Bolt Fixing Type—(Old) JIS A · tapered—	Sprue Bushings Proper Bolt Type—Flange thickness 10mm · Straight—	—Flange thickness 10mm · Tapered—
SBB□—B SBB□H—B	SBB□ SBB□H	SBG□ SBG□H	SBBJH SBBYH	SJA□ SJA□E SJA□H	SJG□ SJG□E SJG□H	SBB□ SBB□H	SBG□ SBG□H
749 749	751 751	751 751	753	755 755 755	755 755 755	757 757	757 757

Cooling Sprue Bushings—Flange thickness 10mm—	Sprue Bushings Normal Bolt Type—Flange thickness 15mm · Straight—	—Flange thickness 15mm · Tapered—	—Flange thickness 20mm · Straight—	—Flange thickness 20mm · Tapered—	Sprue Bushings Normal Bolt Type—Flange thickness 8mm · Straight—	—Flange thickness 8mm · Tapered—	Sprue Bushings Shoulder Type—Straight—	—Tapered—
SBC□ SBC□H	SBB□ SBB□H	SBG□ SBG□H	SBB□ SBB□H	SBG□ SBG□H	SBB□S SBB□	SBB□TS SBB□T	SBS□ SBS□H	SBT□ SBT□H
759	761 761	761 761	763 763	763 763	765 765	765 765	767 767	767 767

Sprue Bushings Shoulder Type—(Old) JIS B · Straight—	—(Old) JIS B Type · Tapered—	Sprue Bushings Normal Bolt Type—Electroforming · Flange thickness 10mm—	—Electroforming · Flange thickness 15mm—	Sprue Bushings—Electroforming/(Old) JIS A—	Sprue Bushings Shoulder Type—Electroforming—	—Electroforming/(Old) JIS B—	Thread Prevent Caps	Sprue Bushings for Extension Nozzle—Locating presser type—
SJB□ SJB□H	SJT□ SJT□H	SBBN SBBNT	SBBE SBBET	SBJE SBJET	SBSN SBSNT	SBJN SBJNT	M—SK2	SXHM SXHD
769 769	769 769	773 773	775 775	777 777	779 779	781 781	783	784







Sprue Bushings for Extension Nozzle—Straight—	—Tapered—	Sprue Bushing Guides	Sprue Lock Bushings —Head Type B dimension designation · B dimension selection/Straight type—	Locating Rings—Bolt type (2 holes)—	—Bolt type (4 holes)—	—Bolt type—	—JIStype—	—Runner lock pin pressing type—	Locating Rings —Large diameter type—
SX□ SXD□ SXC□	SXT□ SXG□ SXS□	SBGN	SLBF SLBH SLBS	LRBS	LRBF	LRBD	LRJS	LRJST	LRK
785	785	787	789 789 789	791	791	791	791	791	791

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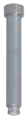
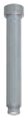
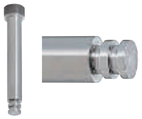
Product Name	Part Number	Page
Locating Rings—Reversible type—	LRBW	792
—Shoulder type—	LRSS	792
—Shoulder type—	LRSD	792
Locating Adapter Ring	LAR	792
Locating Rings Packed	10・20PACK—LRBS	794
	10・20PACK—LRSS	794

COMPONENTS OF RUNNER ELECTRODES

Product Name	Part Number	Page
Runner Lock Pins—Straight・standard type—	RLR RLR□ RLR□F	799
—Straight・hard lock type—	RLH RLH□ RLH□F	800
—Tapered・standard type—	RLT□ RLT□F	801
—Tapered・hard lock type—	RHT□ RHT□F	802



Product Name	Part Number	Page
Runner Lock Pins—Straight・with introduction type—	RLRSB	803
	RLRSBF	803
—Straight・tip edge type—	RLREB	804
	RLREBF	804
—Straight・cone-shaped tip type—	RLK□	805
	RLK□F	805
Runner Lock Pins—Straight・super hard lock type—	RLEL	806
Runner Lock Pin Collars	RLC	806
Runner Lock Pin Bushings	RLBS RLBT RLBST	807
Runner Ejector Sets	RES RESA RESB	808

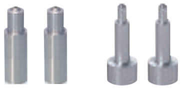
Product Name	Part Number	Page
Runner Change Pins—L dimension selection/designation type(for Z pin combination)—	RCPNZ RCPLZ	809
—For ejector pins L dimension selection type・L dimension designation type—	RCPN RCPL	811
—For fixed side type—	RCPK	813
Adjustable Pins For Runner Flow—L dimension selection・designation type—	RFAN RFAL	817
Adjustment Bolts for Runner Flow Rate	RRCB	819
Electrodes for Pin-point Gate	EMPG (For processing of SR part)	821
	EMPGA (For processing of gate part)	821
Electrodes for Oblique Gate	EMSG	822
Undersized Tapping Electrodes	EMTA EMTWA EMTB	823
Electrodes for Round Engraving	EMLM	824

COMPONENTS OF GATE

Pin-point Gate Bushing

SKH51

Product Name	Part Number	Page
Pin-point Gate Bushings—SKH51・B dimension selection・SR the inside diameter type—	PGHB□A	829
—SKH51・B dimension selection・inner tapered type—	PGHBV□A	831
—SKH51・B dimension selection・acute angle type—	PGHBZ□A PGHBVZ□A	833
Pin-point Gate Bushings—SKH51・B dimension designation・SR the inside diameter type—	PGH□A PGHZ□A	835
—SKH51・B dimension designation・inner tapered type—	PGHV□A PGHVZ□A	837
—SKH51・D dimension designation type—	PGHD□A PGHDZ□A	839
—SKH51・Large K° type—	PGHF□A PGHFZ□A	841



Pin-point Gate Bushing Material Electroforming

Product Name	Part Number	Page
Pin-point Gate Bushings—SKH51・Inner diameter SR type with head—	PGHT□A	843
—SKH51・inner tapered type with head—	PGHVT□A	845
—SKH51・Prepared hole type—	PGHTBL	847
—SKH51・Small diameter type/Small diameter head type—	PGHS PGXS	849
	PGHST PGXST	850
Pin-point Gate Bushings—Electroforming・B dimension selection・SR the inside diameter type—	PGEB□A	851
	PGKB□A	851
—Electroforming・B dimension selection・inner tapered type—	PGEBV□A	853
—Electroforming・B dimension designation・SR the inside diameter type—	PGE□A	855
	PGK□A	855

Pin-point Gate Bushing Material Carbide

Product Name	Part Number	Page
Pin-point Gate Bushings—Electroforming・B dimension designation・inner tapered type—	PGEV□A	857
—Electroforming・D dimension designation type—	PGED□A	859
	PGKD□A	859
—Electroforming・Head type—	PGET□A	861
	PGKT□A	861
Pin-point Gate Bushings—Electroforming・Small diameter type—	PGES	863
	PGKS	863
—Electroforming・Small diameter type with head—	PGEST	864
	PGKST	864
Pin-point Gate Bushings—Carbide・B dimension selection type—	PGWB□A	865

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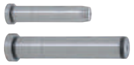
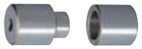
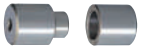
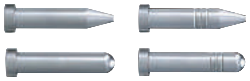
	Pin Gate Extension Bushing Tunnel Gate Blanks				LEADER COMPONENTS			
−Carbide・B dimension designation type− PGW□A		Pin Gate Extension Bushings PGE□ PGE□R	−Headless type− PGEHS PGENS	Rolling Gate Cut Units MRGC	Product Name Part Number	Precision Leader Pins−Head・Plain Blank type− GPH	−Head・Plain Press-fit length designation type− GPHLO GPH−XLO	−Head・Oil Groove L dimension selection type− GPJ
867		869 869	869	872	Page	881	883	886

							
− Head・Oil Groove Press-fit length designation type− GPJL GPJ−XL	− Head・Oil Groove Press-fit length designation type− GPHLSP	Precision Leader Pins−Head type− GPHLO□ GPH−XLO□	Leader Pins with diameter of recess− Head・Plain Recess/Press-fit designation type− GPHOT GPHOT−XL	Precision Leader Pins−Straight・Plain Recess/Press-fit designation type− GPSL GPS−XL	−Straight・Oil Groove Press-fit length designation type− GPOL	Leader Pins with diameter of recess−Straight・Plain Recess/Press-fit designation type− GPSOT	Precision Leader Pins with Spiral Vent−Straight− GPSLO□ GPS−XLO□
887 888	889	891	893	895	897	899	901

Leader Pins for Middle/Large Mold GPX GPP	Assist Pins for Leader Pin GAP	Straight Leader Pins for Middle/Large Mold−Bolt type− GPPTA	−Joint type− GPPTB	Assist Pins for Leader Pin GAPT	Support Pins−Plain Press-fit length designation type− SPP	Support Pins−Oil Groove Press-fit length designation type− SPP−OC	Support Pin Collars SPS SPD	Precision Leader Bushings −Head type with oil groove− GBH	−Straight type with oil groove− GBS
903	904	905	906	906	907	908	910	911	912

Leader Bushings −Head type with oil groove− GBHE	−Straight type with oil groove− GBSE	−Head type with no oil groove− GBAM	−Straight type with no oil groove− GBBM	Oil-free Leader Bushings−Special solid lubricant embedded type with head− GBHEZ	−Straight/Special solid lubricant embedded type− GBSEZ	−Copper alloy type with head− GBHDZ	−Straight/Copper Alloy Type− GBSDZ	Oil-Free Leader Bushings for High Temperature Use−Special copper alloy with head− GBHKZ	−Straight/Special Copper Alloy− GBSKZ
913	914	915	916	917	918	919	920	921	922

				COMPONENTS FOR POSITIONING				
Leader Bushings for Middle/Large Mold−Straight type− GBST	Stopper Plates for Leader Bushings for Middle/Large Mold GPPH	Leader Pins for Rubber Mold GMT GMR	Leader Bushings for Rubber Mold GMB	Product Name Part Number	Tapered Pin Set −Standard type− TPN TPNV□ VTPN□ ZTPN□	−Bushing PL installation type− TPNC TPV□ VTPV□ ZTPV□	−Pin・Bushing PL installation type− TPVX□ VTPVX□	Positioning Straight Pin Sets−Standard type− TPNF□
923	923	924	924	Page	927	929	931	932

							
Positioning Straight Pin Sets−Bushing PL installation type− TPNFC□	−Pin・Bushing PL installation type− TPNFCX□	Small Diameter Positioning Pins・Bushings with Head F−TPNF□	Spacers for Tapered Pin Set TPS TPD TPG	−Thickness designation type− FTPS FTPD FTPG	Positioning Pins−Shaft diameter (D) selection type／Shaft diameter (P) designation 0.01mm increments type− PPD□ PPH□ PPDF□ PPHF□	Tapered Leader Pin Sets TGPS	Positioning Pins for Insert Molding PPI PPIR
933	934	935	937	938	939	941	942

STANDARD COMPONENTS FOR PLASTIC MOLD
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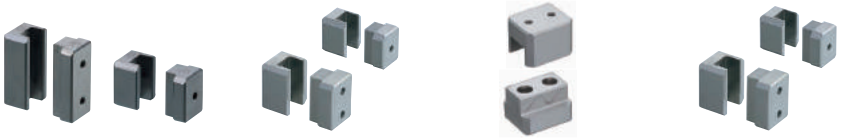

Tapered Block Sets TBS 943
—Precision type— VTBS□ 943
Positionig Straight Block Sets—PL installation type— TBSF 945
—Oil Groove PL installation type— TBSFM 946
Extra Precision Positionig Straight Block Sets—PL installation type— VTBSF 947
—TiN coating · Side installation type— TSSBN 948
Side Tapered Block Sets—Side installation type— TSST 949
—SIDE INSTALLATION TYPE— TSSB 951
—Oil Groove SIDE INSTALLATION TYPE— TSSBM 951

Extra Precision Side Straight Block Sets—Side installation type— VTSSB 952
Positioning Straight Block Sets—PL installation · L dimension short type— TTSB VTTSB 953
Positioning Block Sets LBJX□ 955
Side Cotter Block LKWN 956

COMPONENTS FOR EJECTOR SPACE

Product Name / Part Number — Page
Precision Ejector Leader Pins—Inlay type— EGH 961
—Striking type— EGHC 962
—Striking type— EGHN 962
—C ring type— EGHR 963
Ejector Leader Pins EGPD 964 EGPP 964

Precision Ejector Leader Pins—Bolt fixing counterbore type— EGZA 965
—Bolt fixing through hole type— EGHA 966
Ejector Leader Pins for Middle/Large Mold—Stepped type— EGPDX 967
—Bolt hole type— EGPDHE EGPDHF 967
Ejector Leader Bushings—Plain— EGBH 968
—S dimension long type— EGBN 968
—Oil-free type— EGBHZ 969
—Copper alloy · Oil-free type— EGBZS 969
—High temperature use · copper alloy · Oil-free type— EGBPK 969
—Long S dimension/Oil-free type— EGBNZ 970
—Long S dimension · Copper · Oil-free type— EGBZ 970
—Long S dimension · alloy · Oil-free type— EGBSK 970

— Linear guide type · Steel ／Stainless— EGBL EGBLT EGBLS 971 EGBS EGBW 972
Ejector Leader Bushings—Ball type— EGBB 973
Ball Retainers EMBS 974
Return Pins—Blank type— RP□TH RP□TJ 977
—L dimension designation type— RP□TL RP□TV RP□TZ 979
—L dimension designation with tap hole type— RP□TLM RP□TVM RP□TZM 981
Return Pins for Middle/Large Mold RP8TX□ 983 RP8TSM 984
Early Return Units for Ejector Plate ERST 987
Bolts for Ejector Plate Set EPB 990
Support Pillars—Tapped type— SPL 991

Support Pillars—With dowell hole— SPLG 993
—Bolt hole type— DSPL DSF 995
—Fully quenched type— HSP HSPL 997
Stepped Support Pillars SPLF 998
Stroke Adjustment Collars SPLC 999
Covers for Ejector Space AEC 999
Spacer Rings SPW SPWG SPWD 1000
Stopper Rings STR STPB 1000
Stoper Pins STPH STPN 1000
Ejector Rods ERDW CBW 1001
—Free designation type— ERDFF ERDFX 1002
Ejector Plate Return Detection Switches EGS EGS—V 1003

Ejector Plate Return Detection Switches EPRSR—24V 1005
Cables for Ejector Plate Return Detection Switch EPRS—24VT 1006 EPRSC 1006
Ejector Plate Return Detection Switches EGSM 1007 EGSP 1007

MOLD OPENING CONTROLLERS

Product Name / Part Number — Page
Stop Bolts STBG 1011
Urethane Washers UW 1012
Puller Bolts—Female screw type— PBTN 1013
—Male screw type (Enhanced)— PBTK 1014
—Male screw type— PBTX 1014
Puller Bolt Collars PBC 1014
Actuator Rods for Parting Lock PLRD 1016

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Parting Locks	PL PLB PLP	1017
Parting Locks—Heat-resistant 120° · Anti-Wear type—	PLH PLHB PLPH	1018
Parting Lock Bushings	PLBS	1019
—PL installation type—	PLBSP	1020
Parting Lock Sets	PL□ PL□—□□ PRS□ PRK□ PRL□	1023
—Compact type—	PLSW PLSW—□□ PR□W	1024
Parting Lock Sets—Mold opening · mold closing control type—	PL□Z PR□Z PR□ZM	1025
Roller Lock Sets	MPLK MPLKS MPLKB MPLKSB	1027
—Heat proof standard/Heat proof long type—	MPLKH MPLKHS	1027
Magnet Lock Sets—Normal type—	MLK	1029
—Compact type—	MLKC	1029

Tension Links—Stepped type—	TL TLH	1032
—Long stroke type—	TLK TLKH	1033
—Adjustable stroke type—	TLW TLWH	1034
—Stroke designation type—	TLD TLDH	1035
Special Bolts for Tension Link	LKB	1036
	LKBH	1036
Retainers for Tension Link	LKR LKRB LKRH LKRBH LKT LKTB	1036
Tension Chain Holders	TCHH	1037
Tension Chains	TCHE JNTC	1038

Mold Opening Prevention Plates—Standard—	OPP—C OPPH—C OPPS	1039
—L dimension designation type—	OPPF OPPSF	1040
—Cut-out L dimension designation type—	DPPFN	1041
Urethane Springs	MAZ	1041
Pusher Pins	PSP	1042

COOLING ITEMS ①
COUPLERS
QUICK FITTING JOINTS

Product Name	Part Number	Page
Mold Couplers—Sockets · Heat resistant 80℃—	KSH · KTSH	1049
	KSM · KTSM	1049
	KFF KTFF	1049
—Sockets · Heat resistant 120℃	F120—KSH	1049
· Hose Attachment Type · Ball Lock Type	F120—KTSHBL	1049
· L-shaped	F120—KSHL	1049
· Female screw joint	F120—KSM	1049
· Male screw joint—	F120—KFF	1049

Product Name	Part Number	Page
Mold Couplers—Plugs—	KPM	1050
	JPSH	1050
	JPS	1050
	KPP	1050
Mold Couplers—Plugs—	LJPSH	1051
	LJPS	1051
	KPH	1051
	LSPM	1052
	LSP	1052
High Couplers for Cooling Pipe—Sockets · Heat resistant 80℃—	KHSH	1053
	KHSM	1053
	KHSF	1053
—Sockets · Heat resistant 120℃—	F120—KHSH	1053
	F120—KHSM	1053
	F120—KHSF	1053

Product Name	Part Number	Page
High Couplers for Cooling Pipe—Plugs—	KHPM	1055
	JPLH	1055
	JPL	1055
	KHPH	1055
	KHPF	1055
	LJPLH	1056
	LJPL	1056
	JPHLM	1056
	JPHL	1056
Joints for Cooling Water—Slim design Sockets—	F120—MJTSH	1057
	F120—MJTFF	1057
	F120—MJTSL	1057
Joints for Cooling Water—Plugs—	JPJ	1058
	JPJH	1058
	LJPJH	1059
	LJPJ	1059
	JPLJM	1059
	JPLJ	1059

Product Name	Part Number	Page
Valveless TSP Couplers for Cooling—Sockets—	F120—TSH	1060
	F120—TSF	1060
—Plugs—	F120—TPM	1060
	F120—TPF	1060
Large Flow Mold Couplers—Sockets · Plugs—	K□—KSH	1061
	K□—KPM	1061
	K3—JPSH	1061
Double Valves SP Couplers for Cooling—Sockets—	F120—SF	1062
—Plugs—	F120—PM	1062
	F120—PF	1062
Compact Double Valves Cooling High Flow Couplers—Sockets · Plugs—	F120—HFLS	1063
	F120—HFLM	1063
	F120—HFLP	1063
Packing Products Mold Couplers—Plugs—	50 · 100PACK—JPS	1064
High Couplers for Cooling Pipe	50 · 100PACK—JPL	1064

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Product Name	Part Number	Page
Couplers (Stainless Steel)—Sockets—	SF120—MFTF	1065
	SF120—MJTFF	1065
(Stainless Steel) —Plugs—	SUS—JPSH	1066
	SUS—JPLH	1066
	SUS—JPJH	1066
Double Valves SP Couplers for Cooling—Sockets—	SF120—SF	1067
—(Stainless) Plugs—	SF120—PM	1067
	SF120—PF	1067
Compact Double Valves Cooling High Flow Couplers—Sockets · Plugs—	SF120—HFLS	1068
	SF120—HFLP	1068
Valveless TSP Couplers for Cooling—Sockets—	SF120—TSH	1068
	SF120—TSF	1068
—(Stainless) Plugs—	SF120—TPM	1068
	SF120—TPF	1068

Product Name	Part Number	Page
Hose Nipples	NPWN□	1069
	NPWS	1069
	NPWL	1069
	NPW	1070
	NPL	1070
L-Shaped Swivel Hose Nipples—Heat resistant 120℃type—	LSNM	1070
	LSN	1070
Quick-fitting Joints for Mold Cooling—Standard type (Heat resistant 60℃ series)—	M—PC	1073
	M—PCX	1073
	M—POC	1074
	M—POCL	1074
Quick-fitting Joints for Mold Cooling—Standard type (Heat resistant 60℃ series)—	M—PL	1075
	M—POL	1075
	M—PLL	1075

Product Name	Part Number	Page
Quick-Fitting Joints for Mold Cooling —Standard (Heat resistant 80℃ series)—	M—80PC	1076
	M—80POC	1076
Quick-fitting Joints for Mold Cooling—For high temperature (Heat resistant 99℃ series)—	M—KC	1077
	M—KOC	1077
	M—KL	1078
	M—KH	1078
Quick-fitting Joints for Mold Cooling—For high temperature type (Heat resistant 120℃ series)—	M—120KC	1079
	M—120KOC	1079
	M—120KL	1080
	M—120KH	1080
Quick-fitting Joints for Mold Cooling—For high temperature type (Heat resistant 99℃ series)—	M—AKC	1081
	M—AKL	1081
	M—AKCP	1082
	M—AKLP	1082
	M—AK	1082

Product Name	Part Number	Page
Quick-fitting Joints for Mold Cooling—For high temperature type (Heat resistant 120℃ series)—	M—120AKC	1083
	M—120AKL	1083
	M—120AKCP	1084
	M—120AKLP	1084
—Components—	M—AK	1084
Bolting Joints for Mold Cooling—For high temperature type (Heat resistant 120℃ series)—	M—NSC	1086
	M—NKC	1086
	M—NSL	1086
	M—NKL	1086
Mold Coupling—Sockets—	10PACK—MKSH	1087
	10PACK—MKSM	1087
	10PACK—MKSF	1087
—Plugs—	10 · 30PACK—MKPM	1087
Mold High Coupling—Sockets	10PACK—HKSH	1088
	10PACK—HKSM	1088
	10PACK—HKSF	1088
—Plugs—	10 · 30PACK—HKPM	1088

Product Name	Part Number	Page
Both Valves SP coupling —Sockets—	10PACK—SPSF	1089
—Plugs—	10PACK—SPPM	1089
	10PACK—SPPF	1089
Both Valves SP coupling —Sockets—	10PACK—SPSFS	1090
—(Stainless) Plugs—	10PACK—SPPMS	1090
	10PACK—SPPFS	1090
Quick-fitting Joints for Mold Cooling—Standard type (Heat resistant 60℃ series)—	10 · 30PACK—ASC	1091
	10 · 30PACK—ASOC	1091
	10 · 30PACK—ASPL	1091
Bolting Joints for Mold Cooling—For high temperature (Heat resistant 180℃ series)—	10 · 30PACK—NASC	1092
	10 · 30PACK—NASL	1092

COOLING ITEMS② JOINTS · HOSES COOLING INSIDE OF MOLD

Product Name	Part Number	Page
Cooling Joint Plugs	JTW	1095
	JTWS	1095
	HX—JTW	1095
—Converting tapered screw type—	JTWF	1096
Cooling Adapter Joints	JEMM JEMMR	1097
	JEMF JEMFR	1097
Cooling Adapter Joints	JEFS JEFSR	1098
L-shaped Cooling Joints	JEFL	1099
	JEFLR	1099
	JELF	1099
L-shaped cooling Swivel Joints	LSNF	1100
	SUS—LSNF	1100
	LSNFM	1100

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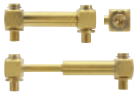
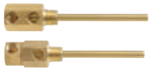
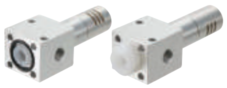
Tubes for Hot Water			Tube Cutters	Insert Sleeves	Rubber Hoses for High Heat		Rubber Hoses for High-Temperature Water	Hot-Water Hose	Hose Band	TSP Couplers—Sockets・Plugs—	
M—NB	M—WE	M—SFT	M—TCN	10PACK—M—WR	KGHA	WHSG	KGH	MHW	MHBT	MH—TSPN	MH—TSPS
1101	1101	1101	1102	1102	1103	1103	1104	1104	1104	1106	1106

Mold-Cooling Flexible Hoses		Plugs for High-Temperature Hose		L-Shaped Plugs for High-Temperature Hose			Mold-Cooling Flexible Hoses (Stainless Steel)		Flexible Hose Plugs (Stainless Steel)		Mold-Cooling Flexible Hoses (Stainless Steel) —Flexible Type—		Uni-joint Plugs	
FSHP	FSHF	FSHG	FSHGR	FSHL	FSHLR	FSHLS	SUS—TKSP	SUS—TKSF	SUS—TKMM	SUS—TKMF	SUS—TKHP	SUS—TKHF	JWRL	JWRF
1107	1107	1108	1108	1108	1108	1108	1109	1109	1110	1110	1111	1111	1112	1112





Uni-joint Plugs—Heat proof type—	Hydro-circuit Blocks—Heat proof type—	Spot cooling pipes		Cooling Pipes —Tapered screw type・Parallel Screw Type—		Cooling Pipes		—Dowel pin type・Flange type—			—Brazing joint・Tapered Brazing joint・screw type—	—Parallel screw・Caulking type—		Baffle Boards—Tapered screw plug type—	Stainless Steel Baffle Boards—Tapered screw plugs type—
JWRH	BRJH	SWCP	SWCT	WCPPT	WCPM	WCP	WCSP	WCPN	WCPST	WCPNT	WCPFT	WCPF	WCPK	BFPT	BFPTS
1113	1113	1114		1115	1115	1115	1115	1116	1116		1117	1117	1117	1118	1119

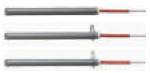


—Partition function type—	Baffle Boards		Spiral Baffle Boards—Separate type／Straight type—				Heat Transaction Pipes	Mold Manifolds		Cooling Circuit Plugs—Combined type—			Tools for Cooling Circuit Plug					Air Jet Coolers for Mold	
BFPTP—S・BFPTP—W	BF□□R	BF□□	WRCAN	WRCTN	WRCBN	WRCCN	WHP	KMB	KMS	JWPZ	50PACK—JWPZ	100PACK—JWPZ	JWPKS	JWPKW	JWPK3	JWPK4	JWPK6	AJCMV	AJCMH
1120	1121	1122	1124	1124	1124	1124	1126	1127		1129	1129	1129	1130					1131	

Cooling Circuit Plugs	—Metal bar type—	Screw Plugs with O-ring	Tapered Screw Plugs		Sealing Tape		Flow Checkers for Cooling Water	Marker Rings	O-rings		
JWP	JWPMT	MSWM	MSWT	MSWTS	JST8—5	JST13—15	FLM—F	JMR	ORS	ORP	ORG
1133	1134	1135	1135	1135	1135	1135	1136	1136	1137	1137	1137

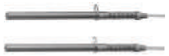
HEATING

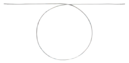
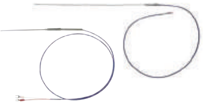
ITEMS



Product Name Part Number	Cartridge Heaters—Output selection type— MCH	—Output designation type— MCHV	Bolts for Cartridge Heater MCHB	Cartridge Heaters—With stopper flange— MFCH	—L dimension・Wattage・Flange selection— MSCHN・MSCHA・MSCHB			—With stopper frange/Lead protection cover— MCHJ	—Lead protection cover／L dimension／Wattage／Flange selection type— MJCHN・MJCHA・MJCHB		
Page	1145	1146	1146	1147	1148	1148	1148	1149	1150	1150	1150

STANDARD COMPONENTS FOR PLASTIC MOLD
2015 Contents

							
Cartridge Heaters—With lead wire bottom reinforced type—	Cartridge Heaters —With knurl cap type—	Cartridge Heaters Soaking Type —L dimension · wattage · flange selection type—	Soaking Type—Lead protection cover／L dimension／Wattage／Flange selection type—	Cartridge Heaters —Heating tip part type—	—L form type—	—L dimension · Wattage · Flange selection Sensor attached type —	Band Heaters
MNCHN · MNCHA · MNCHB	MRCHN · MRCHA · MRCHB	MKCHN · MKCHA · MKCHB	MKJCHN · MKJCHA · MKJCHB	MTCHN · MTCHA · MTCHB	MLCHN · MLCHA · MLCHB · MLCHC	MTSJCHN · MTSJCHA · MTSJCHB	MBH
1151 1151 1151	1152 1152 1152	1153 1153 1153	1154 1154 1154	1155 1155 1155	1156 1156 1156 1156	1157 1157 1157	1159

								
Band Sensors	Lead Wires for Heater	Temperature Sensor Thermocouples	Coupling nipples	Temperature sensor—Screw type—	Temperature sensor—Spring attachment type—	Simplified Thermometer wth Magnet	Simplified Thermometers	Radiation thermometer
SSMB	10PACK—GHRS	SSM SSMJ TMK	CSF	SSMT SSMTJ	SSMH SSMHJ	M—HM	TGU	TGR
1159	1160	1161 1161 1161	1161	1162 1162	1163 1163	1164	1164	1164

HEAT INSULATION SHEETS

Product Name	Standard	Heat Proof	High Strength	High Temperature Proof	High Strength／High Temperature Proof Grade—Thickness High Precision—	Bakelite Paper	Bakelite Cloth	Heat Insulation Sheets Bolt Hole Type
Part Number	HIP□ HIPS—□H	HIPH□ HIPHS—□H	HIPX□ HIPXS—□H	HIPLS HIPLS—□H	HIPXTS HIPXTS—□H HIPGTS HIPGTS—□H	HIPP□ HIPPS—□H	HIPC□ HIPCS—□H	HIP□—□D□4H□ HIP□—□D□6H□
Page	1167	1169	1171	1173	1175	1177	1179	1181

BOLTS SCREWS WASHERS

Product Name	Socket Head Cap Screws	Small Head Cap Screws	Low Head Cap Screws	Socket Head Cap Screws—Through hole type—	Spring Washers	Socket Head Cap Screws	Bolts for Ejector Plate Set	Precision Shoulder Bolts—L dimension designation type—	Shoulder Bolts—Bushing type—
Part Number	CB	CBHS	CBS CBSS	CBA	CBW	FB FBJ	EPB	MSBL	CSR
Page	1185	1186	1187 1187	1188	1188	1189 1189	1190	1191	1191

Shoulder Bolts	Screw Plugs—Through · Washer · JIS · Long · Tapered Type—	WASHERS · SPACERS	Free Washers	Urethane Washers	Washer (Riser Pads) For Heat Insulation	Free Washers for Heat Insulation
MSB	MSW MSWS MSWA MSWAS MSWZ MSWZS MSWJ MSWC MSWT MSWTS	MSRB LRB T R K W SRW SPW SPWG STR SW SSWA USR SBW	MWSC MWFB MWZC MWSCN MWFBN MWZCN	UW	RPSK RPSB RPST RPSZ	MWSCS MWFBS MWZCS
1192	1193 1194	1195 · 1196	1197 1197	1198	1199	1200 1200 1200

Mold Accessories

Product Name	Dowel Pins	Packing Products Dowel Pins	Dowel Pin Extractors	Magnets	Heat Resistant Magnets	Distance Spacers	Name Plates for Plastic Mold	Adjustment Collars
Part Number	MS MSV MSTP MST MSTM MTT MSSH MSTH	100 · 200PACK—MSTH	KNHN KNHN—□	MG MGN HX HXU HXMB	HXH HXUH	DS DSN	PKNPS PKNP	KACL
Page	1203 1203 1203 1203 1204 1204 1204 1204	1205	1205 1205	1206 1206 1206 1206 1206	1206 1206	1207 1207	1208 1208	1208

STANDARD COMPONENTS FOR PLASTIC MOLD
2015 Contents

Swivel Lifting Eye Bolts	Lifting Eye Bolts	Lifting T-shaped Bolts	Lifting Bars for Mold	Holding Plates for Pin	Holding Plates for Pin	Core Pin Hold Screw Plugs	Positioning Screw Plugs	Slotted Keys	Shot Counters for Plastic Mold
SLEB	CHI	TB	KTA KTB	CPHP	APP	MSWPN	MSWG MSWGP	KE□ · KE□S	M—CVPL M—CVEX M—CVR
1210	1211	1211	1212 1212	1213	1213	1214	1214 1214	1215	1216 1216 1216

CHEMICAL PRODUCTS

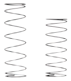
Product Name Part Number	Rust Removers —For mold hydro-circuit— RTCC	Rust-Prevention Agents —For mold hydro-circuit— RST—CC	Lubricants —Grease for precision small diameter ejector pins— GSEPV	Lubricants —Long life grease for ejector pins— LGSEP	Lubricants —Antigall grease for slide cores— HGSSC	Lubricants —Antigall grease for slide cores (for high temperature)— HGSSC—H	Lubricants —Molybdenum disulfide grease for initial running-in grease— GSMOS
Page	Internet			Internet			

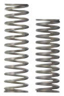
Lubricants —Spray type for hot spot— HSL—SP	Lubricants —Extra heat-resistant grease— GGPBC	Lubricants —Grease for O-ring— GSORG	Detergents—For grease for precision small diameter ejector pins— CLN—GSEPV	Detergent —For antigall grease for slide cores— CLN—HGSSC	Detergent —For long life grease for ejector pins— CLN—LGSEP	Detergent —For molybdenum disulfide grease for initial running-in grease— CLN—GSMOS	Detergents —Quick-drying spray type for mold— CAVCLN
Internet				Internet			

Detergents —Powerful liquid type for soaking— SGW	Detergents —Paste type for removing gas burn— GRVPST	Detergents —Gas spray type for removing gas and burned resin— GRVSP	Rust Removers —Spray type— RTSP	Rust Removers —Powerful liquid type for soaking— CPRSTR	Rust-prevention Agent —Standby (releasing possible) type— RST—DRY	Rust-prevention Agents —Gasification type— RST—VP	Rust-prevention Agents —Spray type for mold maintenance— MLDPRO	Rust-prevention Agents —Powerful liquid type for soaking— RUSTON	Maintenance Oil for Plastic Molds MLDOIL
Internet					Internet				

Burning Prevention Spray for Insulator Sheet COTHIP	Grease for Heat Transaction Pipe MTJ	Lubricant Burning-prevention Agents for Cartridge Heaters HTLB	Adhesives for Mold LOC638 LOC242	Normal Quick-drying Detergent 6PACK—METACL
Internet				

Spring





Product Name Part Number	Wire Springs WY WR WF WL WT WM WH WB	—Internal diameter standard type— NWL NWM	—Long type— WP	Heat Proof Wire Springs WFH WLH WMH WHH
Page	1222～1229	1230	1230	1231～1234

Heat Proof Coil Springs				Coil Springs						Coil Springs		Gate-cut Springs	Coil Spring Washers	Spring Guide Pins
SWY	SWU	SWR	SWS	SWN	SWC	SWF	SWL	SWM	SWH	SWB	SWG	WSW WSV	SSWA SSWB SSWC	SGAMK SGA
1235	1236	1237	1239	1241	1243	1245	1247	1249	1251	1253	1255	1259	1259	1261 1262

Internet catalog is not available in some subsidiaries.

STANDARD COMPONENTS FOR PLASTIC MOLD
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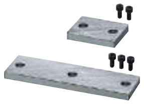
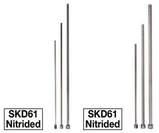
COMPONENTS OF LARGE MOLD



Gas Springs for Plastic Mold	Holder for Gas Spring	Product Name	Stopper Plates	Side Cotter Blocks	Riser pads	Cavity Inserts for Gas Release
MBPGS−A MBPGS−B	MBPGS−H	Part Number	STPX	LKWN	RPS□	BGV
1267	1268	Page	1271	1272	1273	1275

COMPONENTS OF DIE CASTING

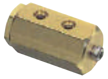


SKD61 Nitrided

SKD61 Nitrided

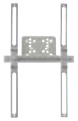
SKD61 Nitrided

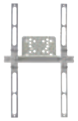
Product Name	Straight Ejector Pins for Die Cast			Stepped Ejector Pins for Die Cast	Ejector Sleeves for Die Cast	Die Cast Core Pins		Date Marked Pins for Die Cast				Holder for Date Marked Pins−Small diameter type−
Part Number	DEP	DEPL	DEPB	DESF	DESL	−Shaft dia. (D) selection type−	−Shaft dia. (P) designation type−	DDMX	DDM□	CDMX	CDM□	CDH
Page	1279	1281	1281	1283	1285	1287	1289	1291	1291	1291	1291	1292



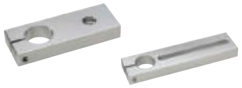
Cooling Units	Pipes for Cooling Unit		Burr Cutting Pins
DCJK	DCJO	DCJI	DCP□
1293	1294	1294	1295

COMPONENTS FOR INJECTION MOLDING





Product Name	Adjustable chuck plates	Adjustable chuck plates−Thin Type−			
Part Number	HCKM	HCKMT−S	HCKMT−SH	HCKMT−W	HCKMT−WH
Page	Internet				



Mini Cylinder Pad−Square Shape−	−Round Shape−	Adjustable Mini Cylinder Brackets	−Shaft−	−Shaft Clamp−	Adsorption Pads	Adsorption Metal Fittings
MBPS	MBPR	MCBF−B	MCBF−SP MCBF−SF	MCBF−HS MCBF−HSL	H−MPCGN H−MPCGS	H−NAMPC
Internet				Internet		

Set screws	Adsorption Pads	Adsorption Metal Fittings	Set Screws	Adsorption Pads	Adsorption Metal Fittings	Adjustable Vacuum Cup Brackets
H−TNMPC	M−PJG□ M−PCG□	KTPCY	TNP□	M−VPS M−VPBS	M−VPHC M−VPHE	MABF−B
Internet				Internet		

−Shaft−	−Shaft Clamp−	Large−Diameter Adjustable		Waterproof polyurethane tube/soft polyurethane tube	Barb Joint · Universality · Universal Elbow · Plug	Miniature quick-fitting joint	Insert for Soft Tube
MABF−S	MABF−H	MABFL−B	MABFL−S	PUT PUTL PUTY PUTYL	SRTG□N MUTEN MPLGN	MNCN MNCNP MNCNL MNCLYT	PUIT
Internet					Internet		

Internet catalog is not available in some subsidiaries.

STANDARD COMPONENTS FOR PLASTIC MOLD
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Product Data／Technical Data

＜Product Data＞
- Guaranteed Range of Shaft-Diameter Precision for Ejector Pins
- Step R and Concentricity of Stepped and Rectangular Ejector Pins
- Guaranteed Range of Hardness of the Ejector Pin Base Material, and Guaranteed Ranges of Nitriding and Surface Hardness
- Ejector Pin Hardness
- Guaranteed Range of Shaft-Diameter Precision for Ejector Sleeves and Center Pins
- Step R and Concentricity of Stepped Ejector Sleeves and Stepped Center Pins
- Guaranteed Range of Tip-Diameter Precision for Stepped Ejector Pins
- Guaranteed Range of Hardness of the Ejector Sleeve and Center Pin Base Material
- Guaranteed Range and Hardness of Nitriding and Surface Hardness
- Ejector Sleeve and Center Pin Combination
- Ejector Pin・Ejector Sleeves Strength Calculation
- Finishing of Ejector Pins and Core Pin Tips
- Finishing of Corners of Rectangular Ejector Pins
- Comparison of Guaranteed Range of Shaft-Diameter Precision between Ejector Pins and Core Pins
- Designation Method and Precision of Key Flat Cutting of Ejector Pins and Core Pins
- Methods for Computing One-step Core Pin Dimensions
- Strength of Inlay Section of Locking Blocks-Positioning Type-
- Relationship between Wedge Angle and Clearance
- Flow Rate when 98kPa for Mold Couplers
- ①Graph of Flow Rate and Pressure Loss Characteristics for Mold Couplers
- ②Graph of Flow Rate and Pressure Loss Characteristics for Mold Couplers
- Calculating Heater Capacity Requirements and JIS Type Tapered Screws
- Cooling-use Plug Attachment Threads
- Property Chart on Heat Insulation Sheets
- Standard Hole Processing Examples①
- Standard Hole Processing Examples②
- Standard Hole Processing Examples③
- Standard Hole Processing Examples④

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Product Data／Technical Data

＜Technical Data＞
- SI(Systeme International d' Unites)
- Calculation of Cubic Volume and Physical Characteristics of Metals
- General Dimensional Tolerance
- Conversion Table of Trigonometric Functions
- Fit Selection Basics
- Dimensional Tolerance and Fits
- Tolerance of Commonly Used Hole Fits
- Tolerance of Commonly Used Shaft Fits
- Conversion Table of Hardness
- Surface Roughness
- Technical Drawings-Method of Indicating Surface Texture on Drawing
- Socket Head Cap Screws
- Table of Diameter of Screw Low Hole (Low Anchor)
- Correct Tightening Axial Force and Correct Tightening Torque for Bolts
- Strength of Bolts, Screw Plugs, and Dowel Pins
- Comparison of Die Steel by Manufacturers・Hardness of Major Steel Products and Corresponding Tools
- Comparison of Materials between JIS and Foreign Standards (1)
- Comparison of Materials between JIS and Foreign Standards (2)

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Business Information
- General Ordering Information
- Contact for Orders

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Index
- Part Number Index
- Product Name Index (Alphabetically)

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HOW TO USE CATALOG

- **Guide to Marks**......42
- **How to use Catalog**......43
- **MISUMI'S Environmental awareness and RoHS compliance**......46
- **Guide for MISUMI EC service**...... 47 ～ 50

HOW TO USE CATALOG

—GUIDE TO MARKS—

Mark	Meaning	Notes · Description examples
M	Material	**M** SKH51
H	Hardness	**H** 58～60HRC
S	Surface Treatment	**S** Black Oxide (Fe_3O_4)
A	Accessories	**A** MS6—25
T	Tolerance	**T** $^{+0.005}_{0}$
RoHS	RoHS Compliant	The product does not contain the six (6) Restricted Substances of RoHS Directive of EU more than the threshold value or the value of the applicable exemption.
❢	Notes:	❢ P/2≦KC＜H/2
⊗	Not Available	Indicates that specific sizes or items are not available for alteration. ⊗ D3 to 8 (D3 to 8: Not available) Also used to indicate specifications that cannot be ordered.
①②③	Unit No.	Number applied to each part of the product that includes two parts or more.
☎	Example of order code	☎ Order Part Number — L MS 6 — 50

Mark	Meaning	Notes · Description examples
🚚	Days To Ship	🚚 Days to Ship Quotation
P	Price	**P** Price
Quotation	Quotation	To be quoted at local MISUMI representative
ex	Example	**ex** Example
	Alteration	Alteration can be ordered without drawings.
☞	Refer To Catalog Page	☞ **P.232**
···▸	Conditions and their results. A···▸B means	$L^{+0.02}_{0}$ ($L>200$ ···▸ $L^{+0.05}_{0}$) When L is larger than 200, L will be $^{+0.05}_{0}$

We employed marks for the universal use of the catalog.

HOW TO USE CATALOG

Product Name

Photograph

Drawing

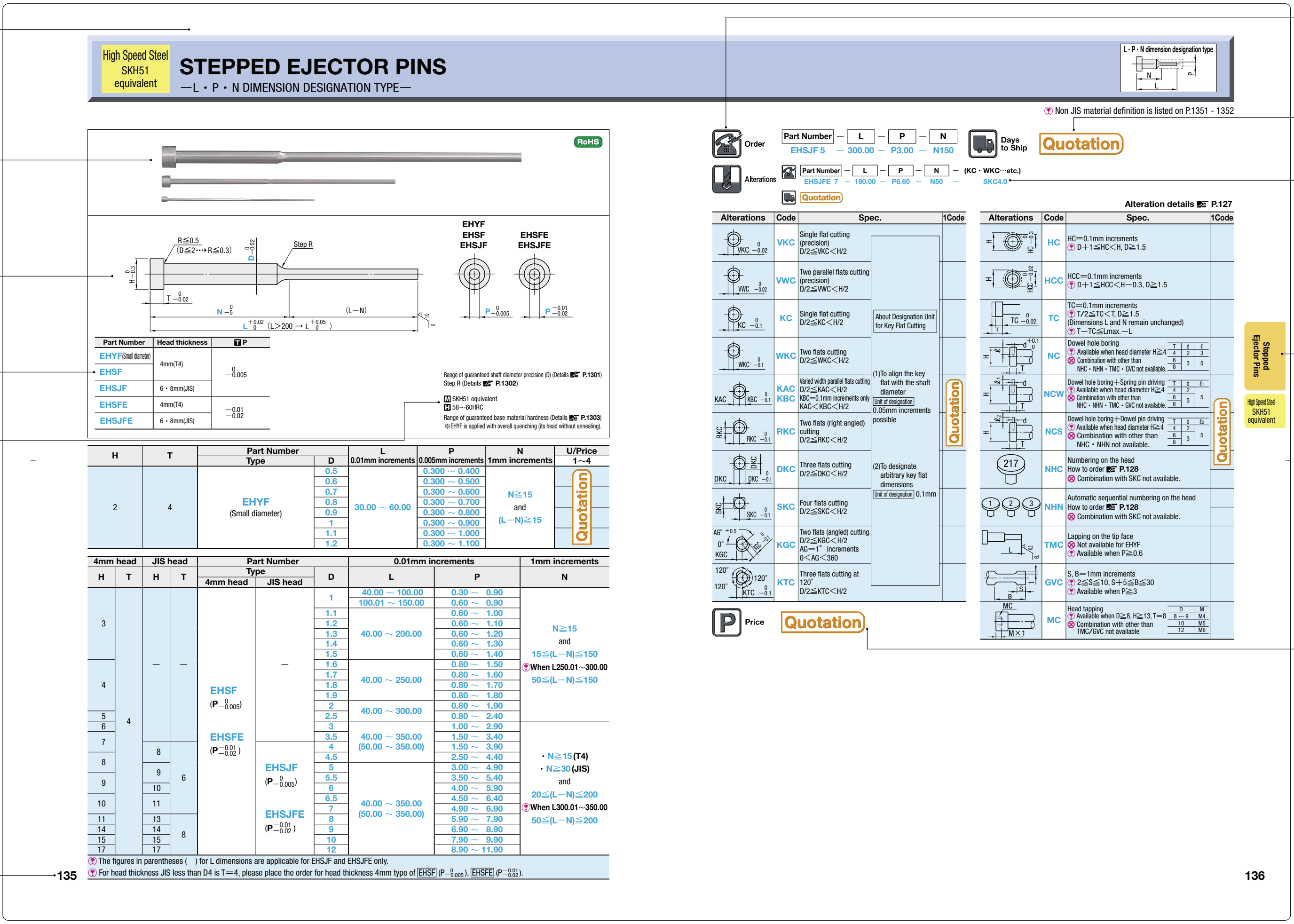
Part Number

Materials and others

Dimension Table

- Select blue characters one by one from the left to find order symbols.
- Dimensions unnecessary to specify for order symbols are covered with blue mesh.
- Printed in red means added specifications, printed in purple means specifications were altered.

Page



High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS

—L・P・N DIMENSION DESIGNATION TYPE—

L・P・N dimension designation type

RoHS

Part Number	Head thickness	T P
EHYF(Small diameter)	4mm(T4)	$^{0}_{-0.005}$
EHSF		
EHSJF	6・8mm(JIS)	
EHSFE	4mm(T4)	$^{-0.01}_{-0.02}$
EHSJFE	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)
※EHYF is applied with overall quenching (its head without annealing).

H	T	Part Number Type	Part Number D	L 0.01mm increments	P 0.005mm increments	N 1mm increments	U/Price 1～4
2	4	EHYF (Small diameter)	0.5	30.00 ～ 60.00	0.300 ～ 0.400	N≧15 and (L−N)≧15	Quotation
			0.6		0.300 ～ 0.500		
			0.7		0.300 ～ 0.600		
			0.8		0.300 ～ 0.700		
			0.9		0.300 ～ 0.800		
			1		0.300 ～ 0.900		
			1.1		0.300 ～ 1.000		
			1.2		0.300 ～ 1.100		

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	D	L (0.01mm increments)	P (0.01mm increments)	N (1mm increments)
3	4	—	—	EHSF ($P^{0}_{-0.005}$) EHSFE ($P^{-0.01}_{-0.02}$)	—	1	40.00 ～ 100.00	0.30 ～ 0.90	N≧15 and 15≦(L−N)≦150 When L250.01～300.00 50≦(L−N)≦150
							100.01 ～ 150.00	0.60 ～ 0.90	
						1.1	40.00 ～ 200.00	0.60 ～ 1.00	
						1.2		0.60 ～ 1.10	
						1.3		0.60 ～ 1.20	
						1.4		0.60 ～ 1.30	
						1.5		0.60 ～ 1.40	
4						1.6	40.00 ～ 250.00	0.80 ～ 1.50	
						1.7		0.80 ～ 1.60	
						1.8		0.80 ～ 1.70	
						1.9		0.80 ～ 1.80	
						2	40.00 ～ 300.00	0.80 ～ 1.90	
5						2.5		0.80 ～ 2.40	
6						3	40.00 ～ 350.00 (50.00 ～ 350.00)	1.00 ～ 2.90	・N≧15(T4) ・N≧30(JIS) and 20≦(L−N)≦200 When L300.01～350.00 50≦(L−N)≦200
7						3.5		1.50 ～ 3.40	
		8	6		EHSJF ($P^{0}_{-0.005}$) EHSJFE ($P^{-0.01}_{-0.02}$)	4		1.50 ～ 3.90	
8						4.5		2.50 ～ 4.40	
		9				5	40.00 ～ 350.00 (50.00 ～ 350.00)	3.00 ～ 4.90	
9						5.5		3.50 ～ 5.40	
		10				6		4.00 ～ 5.90	
10		11				6.5		4.50 ～ 6.40	
						7		4.90 ～ 6.90	
11		13	8			8		5.90 ～ 7.90	
14		14				9		6.90 ～ 8.90	
15		15				10		7.90 ～ 9.90	
17		17				12		8.90 ～ 11.90	

The figures in parentheses ( ) for L dimensions are applicable for EHSJF and EHSJFE only.
For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of EHSF ($P^{0}_{-0.005}$), EHSFE ($P^{-0.01}_{-0.02}$).

135

Non JIS material definition is listed on P.1351 - 1352

Order	Part Number	—	L	—	P	—	N
	EHSJF 5	—	300.00	—	P3.00	—	N150

Days to Ship Quotation

Alterations	Part Number	—	L	—	P	—	N	—	(KC・WKC…etc.)
	EHSJFE 7	—	180.00	—	P6.60	—	N50	—	SKC4.0

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	NC	Dowel hole boring Available when head diameter H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when head diameter H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ1: 4 / 2 / 5; 6, 8 / 3 / 5	
	NCS	Dowel hole boring+Dowel pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T / d / ℓ2: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order P.128 Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 Combination with SKC not available.	
	TMC	Lapping on the tip face Not available for EHYF Available when P≧0.6	
	GVC	S, B=1mm increments 2≦S≦10, S+5≦B≦30 Available when P≧3	
	MC	Head tapping Available when D≧8, H≧13, T=8 Combination with other than TMC/GVC not available D / M: 8～9 / M4; 10 / M5; 12 / M6	

Price Quotation

Stepped Ejector Pins

High Speed Steel
SKH51
equivalent

136

How to order

- Order example

Days to Ship

Alteration

- Select alterations with code. P.45

Index

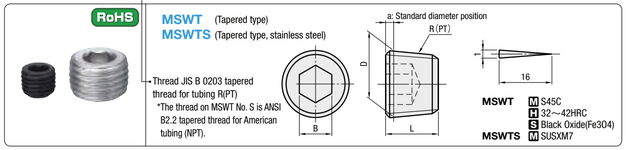
Price

- To know the latest product price, send us RFQ by FAX, E-mail or online Quotation request which is available on Misumi site.

How to find the product

- Use the Contents page to find the products by the shape, Part Number, index, production time and page number. ……P.1～40
- Use the Part Number Index to find the product by the catalog number. ……P.1361
- Use the Product Name Index to find the products by the Product Name. ……P.1372

JIS notation



RoHS

MSWT (Tapered type)
MSWTS (Tapered type, stainless steel)

Thread JIS B 0203 tapered thread for tubing R(PT)
*The thread on MSWT No. S is ANSI B2.2 tapered thread for American tubing (NPT).

a: Standard diameter position

MSWT M S45C
H 32～42HRC
S Black Oxide(Fe3O4)
MSWTS M SUSXM7

- The indication of JIS standard on the page of each commodity is for reference only and does not signify onspec product.
- Non JIS material definition is listed on P.1351 - 1352

ALTERATION SERVICE

Alteration Service

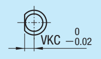
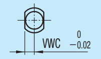
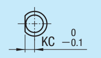
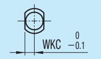
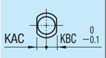
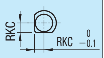
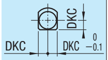
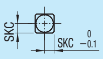
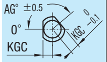
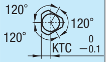
■ Alterations can be ordered without drawings

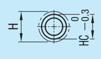
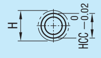
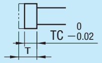
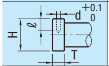
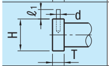
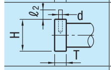
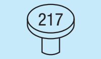
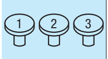
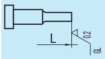
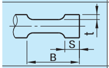
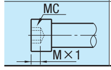
- Our Alteration Service makes it possible for you to select some non-standard tolerance and/or dimensions, or non-standard processing.
  You can easily order alterations by specifying an appropriate code.

■ Alteration Order Example (in case of stepped ejector pins)

	Part Number		L		P		N		
Order	EHSJF 5	—	300.00	—	P3.00	—	N150		
Alterations	EHSJFE 7	—	180.00	—	P6.60	—	N50	—	SKC4.0 (KC・WKC···etc.)

Alteration details P.127

Alterations	Code	Spec.		1Code
	**VKC**	Single flat cutting (precision) D/2≦VKC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**VWC**	Two parallel flats cutting (precision) D/2≦VWC＜H/2		
	**KC**	Single flat cutting D/2≦KC＜H/2		
	**WKC**	Two flats cutting D/2≦WKC＜H/2		
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC＜H/2 KBC＝0.1mm increments only KAC＜KBC＜H/2		
	**RKC**	Two flats (right angled) cutting D/2≦RKC＜H/2		
	**DKC**	Three flats cutting D/2≦DKC＜H/2		
	**SKC**	Four flats cutting D/2≦SKC＜H/2		
	**KGC**	Two flats (angled) cutting D/2≦KGC＜H/2 AG＝1° increments 0＜AG＜360		
	**KTC**	Three flats cutting at 120° D/2≦KTC＜H/2		

Alterations	Code	Spec.	1Code
	**HC**	HC＝0.1mm increments ❗ D＋1≦HC＜H, D≧1.5	Quotation
	**HCC**	HCC＝0.1mm increments ❗ D＋1≦HCC＜H－0.3, D≧1.5	
	**TC**	TC＝0.1mm increments ❗ T/2≦TC＜T, D≧1.5 (Dimensions L and N remain unchanged) ❗ T－TC≦Lmax.－L	
	**NC**	Dowel hole boring ❗ Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T d ℓ 4 2 3 6 3 5 8	
	**NCW**	Dowel hole boring＋Spring pin driving ❗ Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T d ℓ1 4 2 5 6 3 8	
	**NCS**	Dowel hole boring＋Dowel pin driving ❗ Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ2 4 2 5 6 3 8	
	**NHC**	Numbering on the head How to order **P.128** ⊗ Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order **P.128** ⊗ Combination with SKC not available.	
	**TMC**	Lapping on the tip face ⊗ Not available for EHYF ❗ Available when P≧0.6	
	**GVC**	S, B＝1mm increments ❗ 2≦S≦10, S＋5≦B≦30 ❗ Available when P≧3	
	**MC**	Head tapping ❗ Available when D≧8, H≧13, T＝8 ⊗ Combination with other than TMC/GVC not available D M 8～9 M4 10 M5 12 M6	

MISUMI'S ENVIRONMENTAL AWARENESS AND RoHS COMPLIANCE

■ What is RoHS?

RoHS is the directive to speculate and restrict the use of certain hazardous substances in electrical and electronic equipments.
It aims to minimize the hazards on environment and health through the life cycles of products from production to disposal.

■ Restricted Substances of RoHS (substances restricted by RoHS Directive of EU of 8 June, 2011)

No.	Substances		Subject Items and Application	Threshold value[*1]	
1	Cadmium and its compounds		Cadmium contained in alloys with zinc content (brass, zinc, die cast, lead-free solder, etc.), plating, plastic, rubber, coating, etc.	Less than 100 ppm	For packing materials, less than 100 ppm combined of cadmium, lead, mercury and hexavalent chromium
		Exemption	Cadmium and its compounds in electrical contacts	—	
2	Lead and its compounds		Lead contained in all types of alloys, solder, all items other than the following exemptions	Less than 1,000 ppm	
		Exemption	Lead which is alloyed with steel	0.35wt%(3,500ppm) or less	
			Lead which is alloyed with aluminum	0.4wt%(4,000ppm) or less	
			Lead which is alloyed with copper	4wt%(40,000ppm) or less	
			Lead used in solders which contains more than or equal to 85% of lead	—	
3	Mercury and its compounds		Mercury contained in all items aside from small fluorescent light bulbs and straight-tube fluorescent light bulbs	Less than 1,000 ppm	
4	Hexavalent chromium and its compounds		All Hexavalent chromium in chromate treatment, plating, coating, etc.. Chromium metal and chrome in metal alloys are exempted	Less than 1,000 ppm	
5	Polybrominated biphenyls (PBBs)		Flame retardant	Less than 1,000 ppm	
6	Polybrominated diphenylethers (PBDEs)		Flame retardant	Less than 1,000 ppm	

*Threshold value is, whether consciously or not, the maximum concentration value set for each homogeneous material which cannot be mechanically disjoined into different materials.

■ Green Procurement

MISUMI procures products, semi-finished products, parts, raw material, supplementary material, packing, packaging material, etc. from many suppliers.
In order to comply with environmental laws, regulations, and other requirements related to chemical substances and to achieve a sustainable society, MISUMI has prepared MISUMI Green Procurement Guidelines. Please refer to our website for details.

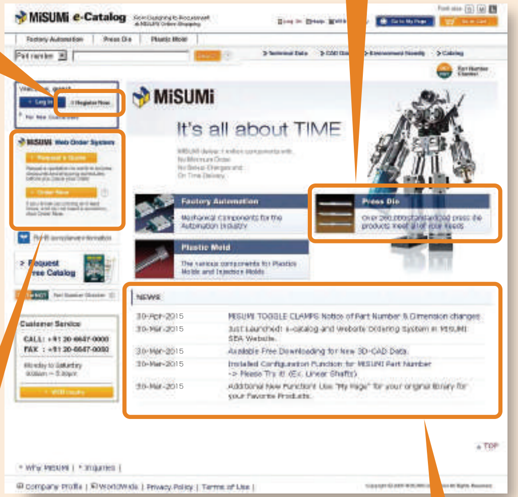
HOW TO USE WEB ORDER SYSTEM 1

So easy to get quotes and place orders!!

WOS

What is Web Order System?

Misumi's Web Order System (WOS) enables you to get a quotation and/or place an order of items listed in our catalog through the internet. Please take advantage of this service available for you to enhance your business!


MISUMi e-Catalog
MISUMi
It's all about TIME
Factory Automation
Press Die
Plastic Mold
NEWS

Product Information
Product information based on catalogues and technical data are here.

Register Now
In order to use this service, please go to register screen and fill out necessary information.

Log in ID, password?
Once you obtain log in ID and password, you can log in and request a quotation or place an order from here. Contact our Customer Service if you lost the log-in ID, please.

What's New?
Special promotions, Updates and news are listed here, and renewed time to time.

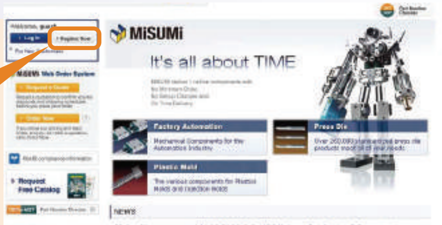
Web Order System is not available in some subsidiaries.

Easy steps to be register

How to register Web Order System?

STEP 1 Click on register now

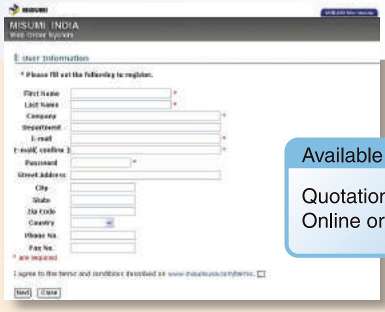
In order to register the log-in ID and password, please click on the box below.


MISUMi
It's all about TIME
Factory Automation
Press Die
Plastic Mold
NEWS

WOS membership registration here

STEP 2 Fill out application form online

Please fill out application form with necessary information.


MISUMI INDIA
User Information

WOS service membership registration here

Available services

Quotation
Online ordering

STEP 3 WOS application is authorized

Received applications will be authorized after the confirmation.
You would be notified by e-mail after the authorization is processed.

Go to the next page for more details

HOW TO USE WEB ORDER SYSTEM 2

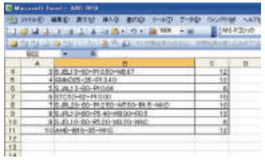
Web Order System is not available in some subsidiaries.

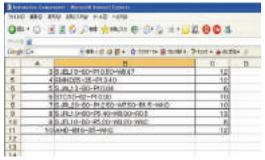
Features 1

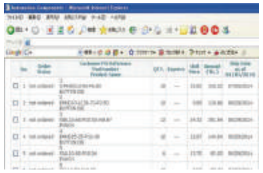
Can I use my Excel spreadsheet?

Yes, it is so easy! You can just cut and paste the Excel spreadsheet.

Copy Excel spreadsheet → Paste the spreadsheet onto WOS screen → Order input is done instantly!







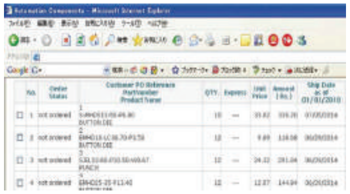
*Excel and other spreadsheet software can be utilized.
*CSV file and TXT files can be uploaded.

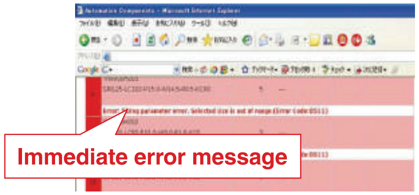
Features 2

Is it possible to verify a part number prior to ordering?

Yes, if incorrect, you are notified with an error message.

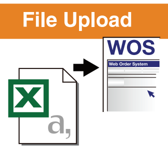
Input part number into WOS → You get an error message immediately if incorrect.





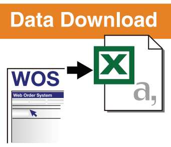
Other Convenient Functions!

File Upload



*CSV, TXT files can be uploaded.

Data Download

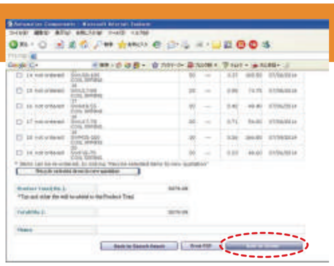


*Download quotation data or order history.

Print Quotation

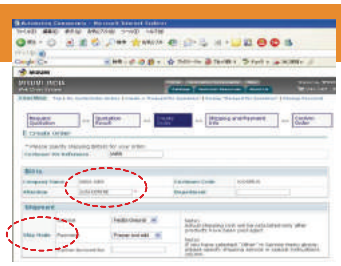
*Print out quotation form on paper or download PDF form.

1.Create an Order



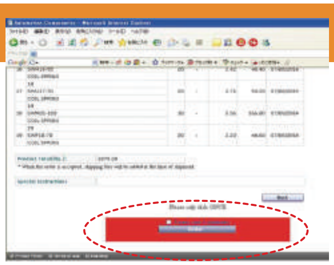
*Once quotation is made, click on My quote and choose the quotation you want to process for the order.
*Select items you want to place as an order.
*Then, click on “Add to order” for next step.

2.Shipping and Payment Information



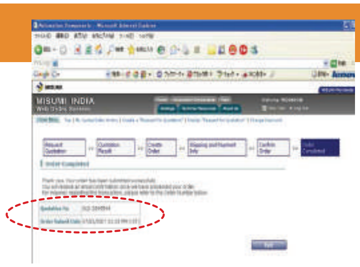
*Select the shipping method and payment options from drop down box.
*Select shipping instruction “Ship Complete”, “Ship Partially”, or “Other” if there are special instructions.
*Click on “Next” for next step.

3.Confirm Order



*Confirm the contents of the order.
*Check terms and conditions, then click “Order”.

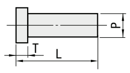
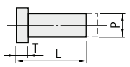
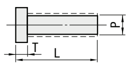
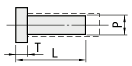
4.Order Verification



*Once your order is processed, you will be given a Quotation number.
*Also, you will receive an e-mail notifying you that the order was acknowledged.

STRAIGHT EJECTOR PINS

Straight Ejector Pins

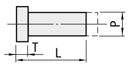
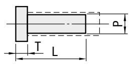
Category		Type	Standard 		L Dimension Designation Type 		P dimension designation, L dimension selection type 		L/P Dimension Designation Type 	
Material	**Head Thickness (T)**	**Shaft diameter (P) Tolerance**	**Part Number**	**Page**	**Part Number**	**Page**	**Part Number**	**Page**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.002	—		EPV−L	P.65	EPV−G	P.65	EPVB	P.65
		0 −0.005	EPH	P.55	EPH−L	P.57	EPH−G	P.61	EPHB	P.63
		−0.01 −0.02	EPHE−B	P.55	EPHE−L	P.57	EPHE−G	P.61	EPHBE	P.63
	4mm (T4) Small diameter	0 −0.005	—		EPY−L	P.57	EPY−G	P.61	EPYB	P.63
	6・8mm (JIS)	0 −0.005	EPHJ	P.59	EPHJ−L	P.59	EPHJ−G	P.61	EPHJB	P.63
		−0.01 −0.02	EPHJE	P.59	EPHJE−L	P.59	EPHJE−G	P.61	EPHJBE	P.63
SKH51 equivalent + Hard chromate plating	4mm (T4)	0 −0.005	—		—		—		C−EPHB	P.67
		−0.01 −0.02	—		—		—		C−EPHBE	P.67
	4mm (T4) Small diameter	0 −0.005	—		—		—		C−EPYB	P.67
	6・8mm (JIS)	0 −0.005	—		—		—		C−EPHJB	P.67
		−0.01 −0.02	—		—		—		C−EPHJBE	P.67
SKD61 equivalent	4mm (T4)	0 −0.005	EPDS	P.77	EPDS−L	P.79	EPDGS	P.77	EPDBS	P.79
		−0.01 −0.02	EPD	P.77	EPD−L	P.79	EPDG	P.77	EPDB	P.79
SKD61 equivalent + Nitriding	4mm (T4)	*Reference tolerance −0.01 −0.02	EPN	P.69	EPN−L	P.71	EPNG	P.73	EPNB	P.75
	6・8mm (JIS)		EPJ	P.69	EPJ−L	P.71	EPJG	P.73	EPJB	P.75
SKD61 equivalent Prehardened	4・6・8mm (JIS)	*Reference tolerance −0.01 −0.02	EPAJ	P.81	EPAJ−L	P.81	EPAJG	P.81	EPAJB	P.81
SUS440C	4mm (T4)	0 −0.005	EPW	P.83	EPW−L	P.83	EPWG	P.83	EPWB	P.83
	6mm (JIS)	0 −0.005	EPWJ	P.83	EPWJ−L	P.83	EPWJG	P.83	EPWJB	P.83

*The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the shaft size and/or length. For details, refer to the Catalog page of each product.

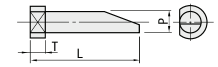
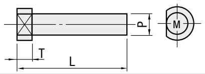
Ejector pins with cutting facets・Taperless one-step core pins with gas vent

Ejector pins with cutting facets

Taperless one-step core pins with gas vent

Category			Type	L Dimension Designation Type 		L/P Dimension Designation Type 	
Type	**Material**	**Head Thickness (T)**	**Shaft diameter (P) Tolerance**	**Part Number**	**Page**	**Part Number**	**Page**
Cutting facets	SKH51 equivalent	4mm (T4)	0 −0.005	GW□−EPH−L	P.89	GW□−EPHB	P.89
			−0.01 −0.02	GW□−EPHE−L		GW□−EPHBE	
		6・8mm (JIS)	0 −0.005	GW□−EPHJ−L		GW□−EPHJB	
			−0.01 −0.02	GW□−EPHJE−L		GW□−EPHJBE	
Gas Release Groove (Tip Diameter designation)		4mm (T4)	0 −0.005	GVB−EPH−L	P.85	GVB−EPHB	P.85
			−0.01 −0.02	GVB−EPHE−L		GVB−EPHBE	
		6・8mm (JIS)	0 −0.005	GVB−EPHJ−L		GVB−EPHJB	
			−0.01 −0.02	GVB−EPHJE−L		GVB−EPHJBE	
Gas Release Groove		4mm (T4)	0 −0.005	GV−EPH−L	P.87	GV−EPHB−L	P.87
			−0.01 −0.02	GV−EPHE−L		GV−EPHBE−L	
		6・8mm (JIS)	0 −0.005	GV−EPHJ−L		GV−EPHJB−L	
			−0.01 −0.02	GV−EPHJE−L		GV−EPHJBE−L	

■Characteristics of materials for straight ejector pins: Refer to P.126.

Straight Ejector Pins with tip process				Straight Ejector Pins with engraving			
L Dimension Designation Type 		L/P Dimension Designation Type		L Dimension Designation Type 		L/P Dimension Designation Type	
Part Number	**Page**	**Part Number**	**Page**	**Part Number**	**Page**	**Part Number**	**Page**
—		—		EPV□M・EPV□MR (Sequential number)	P.113	EPVB□M・EPVB□MR (Sequential number)	P.113
EPH□A	P.97	EPHB□A	P.99	EPH□M・EPH□MR (Sequential number)・EPH□T	P.109・117	EPHB□M・EPHB□MR (Sequential number)・EPHB□T	P.111・117
EPHE□A	P.97	EPHBE□A	P.99	EPHE□M・EPHE□MR (Sequential number)・EPHE□T	P.109・117	EPHBE□M・EPHBE□MR (Sequential number)・EPHBE□T	P.111・117
—		—		—		—	
EPHJ□A	P.97	EPHJB□A	P.99	EPHJ□M	P.109	EPHJB□M	P.111
EPHJE□A	P.97	EPHJBE□A	P.99	EPHJE□M	P.109	EPHJBE□M	P.111
—		—		—		—	
—		—		—		—	
—		—		—		—	
—		—		—		—	
—		—		—		—	
EPDS□A	P.105	EPDBS□A	P.107	—		—	
EPD□A	P.105	EPDB□A	P.107	—		—	
EPN□A	P.101	EPNB□A	P.103	EPN□M・EPN□MR (Sequential number)	P.115	—	
EPJ□A	P.101	EPJB□A	P.103	EPJ□M・EPJ□MR (Sequential number)	P.115	—	
—		—		—		—	
—		—		—		—	
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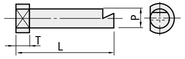
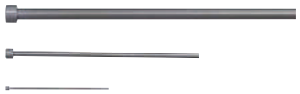
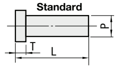
Z Groove Processed Straight Ejector Pins

Edge R

Category		Type	Tip Processed 	
Material	**Head Thickness (T)**	**Shaft Diameter (P) Tolerance**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.005	Z−EPH−L	P.91
		−0.01 −0.02	Z−EPHE−L	

Straight Ejector Pins —Package Products—



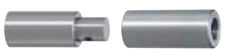
Category		Type	Standard 			
Material	**Head Thickness (T)**	**Shaft Diameter (P) Tolerance**	**Part Number**	**Page**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.005	50PACK−EPH	P.119	100PACK−EPH	P.119
		−0.01 −0.02	50PACK−EPHE		100PACK−EPHE	
SKD61 equivalent + Nitriding	4mm (T4)	−0.01 −0.02	50PACK−EPN		100PACK−EPN	
	6・8mm (JIS)		50PACK−EPJ		100PACK−EPJ	
SKD61	4mm (T4)	−0.01 −0.02	50PACK−EPD		100PACK−EPD	

Pins for ejector block P.121

Close-up of tip end

Part Number EBPJ

Air-Jet Valves P.123・124



Air-Jet Valves Spacers

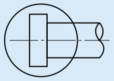
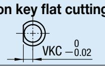
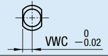
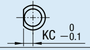
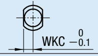
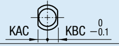
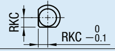
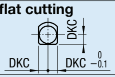
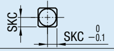
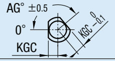
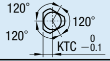
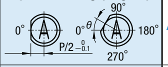
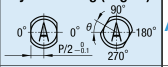
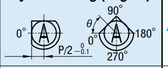
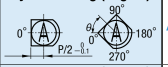
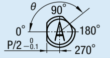
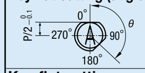
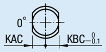
Part Number AJVE AJV AJVS

Spring Pins & Dowel Pins P.124

Part Number WSP MS

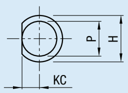
ALTERATION GUIDE FOR STRAIGHT EJECTOR PINS

■ Alteration Guide for STRAIGHT EJECTOR PINS

Items	Applicable Products	Alterations	Code	Specifications	1Code
 Head alteration	Straight Ejector Pins (*Excluding products with head process and engraving)	**Precision key flat cutting** 	VKC	Precision single flat cutting Range of designation P/2≦VKC<H/2 High speed steel SKH51 equivalent only	Quotation
		Precision key flat cutting 	VWC	Precision two parallel flats cutting Range of designation P/2≦VWC<H/2 High speed steel SKH51 equivalent only	
		Key flat cutting 	KC	Single flat cutting Range of designation P/2≦KC<H/2	
		Key flat cutting 	WKC	Two flats cutting Range of designation P/2≦WKC<H/2	
		Key flat cutting 	KAC KBC	Varied width parallel flats cutting Range of designation P/2≦KAC KAC<KBC<H/2	
		Key flat cutting 	RKC	Two flats (right angled) cutting Range of designation P/2≦RKC<H/2	
		Key flat cutting 	DKC	Three flats cutting Range of designation P/2≦DKC<H/2	
		Key flat cutting 	SKC	Four flats cutting Range of designation P/2≦SKC<H/2	
		Key flat cutting (angled) 	KGC	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation P/2≦KGC<H/2 AG=1° increments 0° <AG<360°	
		Key flat cutting (angled) 	KTC	Three flats cutting at 120° Range of designation P/2≦KTC<H/2	
	Straight Ejector Pins with Tip Process & Straight Ejector Pins with Engraving	**Key flat cutting (angled)** 	AKC	Changes the flat position (standard: 0°) clockwise in 1° increments. Range of designation 0° <AKC<360° No need to designate AKC0 Unit of designation 1° increments Designation method θ =45° ···› AKC45	
		Key flat cutting (angled) 	AWC	Adds two parallel flats at the standard (0°) position, or at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° ≦AWC<360° Unit of designation 1° increments Designation method θ =0° ···› AWC0, θ =45° ···› AWC45	
		Key flat cutting (angled) 	ARC	Adds two right-angled flats at the standard (0°) position, or at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° ≦ARC<360° Unit of designation 1° increments Designation method θ =0° ···› ARC0, θ =45° ···› ARC45	
		Key flat cutting (angled) 	ADC	Adds three flats at the standard (0°) position, or at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° ≦ADC<360° Unit of designation 1° increments Designation method θ =0° ···› ADC0, θ =45° ···› ADC45	
		Key flat cutting (angled) 	KGA	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° <KGA<360° Unit of designation 1° increments Designation method θ =135° ···› KGA135	
		Key flat cutting (angled) 	KGB	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position). Please note that standard position 0° is upper surface which is different from other alterations. Range of designation 0° <KGB<360° Unit of designation 1° increments Designation method θ =135° ···› KGB135	
		Key flat cutting 	KAC KBC	Varied width parallel flats cutting ⊗ Combination with other key flat cutting not available Range of designation P/2≦KAC KAC<KBC<H/2	

Specifications for VKC, VWC, KC, WKC, KAC·KBC, RKC, DKC, SKC, KGC and KTC:

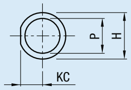
To make a flat at the shaft diameter position



Unit of designation
L dimension designation type (P/2)
······0.05mm increments possible
L/P dimension 0.01mm designation type (P/2)
···0.005mm increments possible
L/P dimension 0.005mm designation type (P/2)
··· 0.0025mm increments possible
L/P dimension 0.001mm designation type (P/2)
··· 0.0005mm increments possible

Designation method	
• VKC2.82	(When P5.64)
• VWC3.375	(When P6.75)
• KC2.61	(When P5.22)
• WKC3.085	(When P6.17)
• KAC3.25—KBC4	(When P6.5)
• RKC2.77	(When P5.54)
• DKC3	(When P6)
• SKC2.5	(When P5)
• KGC1.5—AG125	(When P3)
• KTC3.085	(When P6.17)

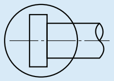
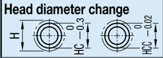
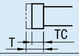
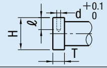
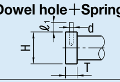
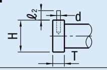
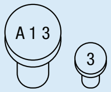
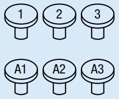
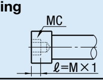
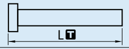
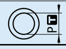
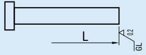
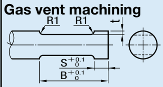
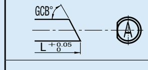
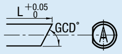
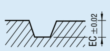
To designate an arbitrary flat size



Unit of designation 0.1mm increments only
Designation method • VKC1.4 • VWC2.3 • KC1.4 • WKC2.3
• KAC1.4—KBC1.6 • RKC1.4 • DKC1.75
• SKC5.8 • KGC1.4—AG135 • KTC2.3

Note that designating (H/2—0.15) or more for Key flat cutting alteration will create hardly any flat on the head.

■ Alteration Guide for STRAIGHT EJECTOR PINS

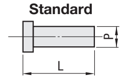
Items	Applicable Products	Alterations	Code	Specifications	1Code
 Head alteration	Straight Ejector Pins	**Head diameter change** 	HC HCC (Precision)	Reduces head diameter. (HCC) Range of designation P+1≦HC<H and P≧1.5 P+1≦HCC<H—0.3 and P≧1.5 Unit of designation 0.1mm increments Designation method HC6.5 HCC6.1	Quotation
		Head thickness change 	TC	Reduces the head thickness. Dimension L remains unchanged (except for standard, P dimension designation/L dimension selection type). Range of designation T/2≦TC<T P≧1.5 T—TC≦Lmax.—L	
		Dowel hole boring 	NC	Dowel hole boring Adds a dowel hole for use with WSP and MS. Designation method NC Available when head diameter H≧4 ⊗ Combination with other than NHC • NHN • TMC • GVC not available. T d ℓ 4 2 3 6 3 5 8 10 4	
		Dowel hole+Spring pin 	NCW	Dowel hole boring and spring pin driving. Designation method NCW Available when head diameter H≧4 ⊗ Combination with other than NHC • NHN • TMC • GVC not available. T d ℓ₁ Spring pin 4 2 5 WSP2 6 3 WSP3 8 10 4 WSP4	
		Dowel hole+Dowel pin 	NCS	Dowel hole boring and dowel pin driving. Designation method NCS Available when head diameter H≧4 ⊗ Combination with other than NHC • NHN • TMC • GVC not available. T d ℓ₂ 4 2 5 6 3 8	
		Numbering 	NHC	Combination with key flat cutting not available. Electrolytic marking of ID code on the head(in 5 point, Round Gothic type). Available characters Numerals: 0～9; Alphabets: A～Z Range of designation 1 character when 2≦H<4.9 1 or 2 characters when 5≦H<6.9 (Only the first character may be an alphabet.) Up to 3 characters when 7≦H (Only the first character may be an alphabet.) Designation method NHC—6, NHC—23, NHC—A90 Available when head diameter H≧2 ⊗ Combination with SKC • MC not available. ⊗ NHC is not available when numbering space in head exceeds the maximum of 1.8 long x 1.8 wide x characters.	
		Numbering 	NHN	Automatic sequential numbering on the head Adds a sequential number on the head of each ejector pin when two or more pieces of identical size are ordered. Available characters Same as NHC (see above) Range of designation Same as NHC (see above) Designation method When 3 pieces are ordered with NHN-1, A sequential number starting from 1 to 3 is added on the head of each piece. When 10 pieces are ordered with NHN-A15: A sequential number starting from A15 (through A24) is added on the head of each piece. Only available when two or more pieces of identical size are ordered. Available when head diameter H≧2 ⊗ Combination with SKC • MC not available.	Quotation
		Tapping 	MC	Creates a tap on the head. Available when P≧8, H≧13, T≧8. Designation method MC When P 8.00～ 9.99 M4 When P10.00～11.99 M5 When P12.00～15.99 M6 When P16.00～25.00 M8 ⊗ Combination with other than TMC • GVC not available.	
Tolerance alteration	Extra Precision Straight Ejector Pins		LKC	Changes L dimension tolerance. $L^{+0.01}_{0}$ ⇨ $L^{+0.005}_{0}$ Designation method LKC (L designation in 0.005mm increments possible) Available when 1.5≦P≦5	
			PKC	Shaft diameter tolerance alteration (range alteration) Designation method PKC $P^{0}_{-0.002}$ ⇨ $P^{-0.001}_{-0.003}$	
Tip alteration	Straight Ejector Pins	**Lapping on the tip face** 	TMC	Lapping on the tip face. Available for L dimension designation and L • P dimension designation types when the material is SKH51 equivalent or SUS440C. Available when P≧0.6 ⊗ EPY-L, EPYB, C-EPYB not available.	
Shaft alteration	Straight Ejector Pins	**Gas vent machining** 	GVC	Gas vent machining Range of designation 2≦S≦10, S+5≦B≦30 Unit of designation S, B=1mm increments Designation method GVC—S3—B20 Available when P≧3 P t 3.00～ 4.99 0.3 5.00～ 9.99 0.4 10.00～12.00 0.5	
Engraving alteration	Straight Ejector Pins with engraving		GCB	Range of designation 60° ≦GCB<90° Unit of designation 1° increments Designation method GCB85 Available when L≦200 ⊗ Combination with GCD not available.	
			GCD	Range of designation 60° ≦GCD<90° Unit of designation 1° increments Designation method GCD80 Available when L≦200 ⊗ Combination with GCB not available.	
			EC	Engraving depth alteration 0.05 ···› 0.1 0.2 ···› 0.1 0.2 ···› 0.3 Designation method EC Available when P≧1 ⊗ Combination with GCB • GCD not available.	

High Speed Steel
SKH51 equivalent
4mm head

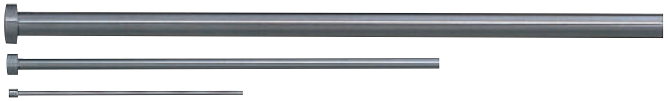
STRAIGHT EJECTOR PINS

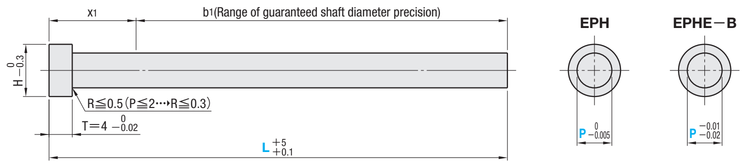
—STANDARD—

Standard



Non JIS material definition is listed on P.1351 - 1352


RoHS



Part Number	Head thickness	T P
EPH	4mm(T4)	$^{0}_{-0.005}$
EPHE−B		$^{-0.01}_{-0.02}$

EPH・EPHE−B (when P=0.2) is applied with overall quenching. (Head without annealing)

Range of guaranteed shaft diameter precision (Details P.1301)
T4 ···› x1 max.30

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details P.1303)

H	T	Part Number						L						
		Type	P					Selection						
2	4	**EPH** ($P^{0}_{-0.005}$) **EPHE−B** ($P^{-0.01}_{-0.02}$)	0.2					60						
3			0.3					60						
			0.4	0.5				60	100					
			0.6	0.7					100	150				
			0.8	0.9					100	150				
			1	1.1	1.2	1.3	1.4		100	150	200			
			1.5						100	150	200	250		
4			1.6						100	150	200	250		
			1.7	1.8	1.9				100	150	200			
			2						100	150	200	250	300	
5			2.1						100	150	200	250		
			2.2	2.3	2.4				100	150	200			
			2.5						100	150	200	250	300	
6			2.6						100	150	200	250		
			2.7	2.8	2.9				100	150	200			
			3						100	150	200	250	300	350
7			3.1						100	150	200	250		
			3.2	3.3	3.4				100	150	200			
			3.5						100	150	200	250	300	350
			3.6						100	150	200	250		
			3.7	3.8	3.9				100	150	200			
			4						100	150	200	250	300	350
			4.1						100	150	200	250		
8			4.2	4.3	4.4				100	150	200			
			4.5						100	150	200	250	300	350
			4.6						100	150	200	250		
			4.7	4.8	4.9				100	150	200			
			5						100	150	200	250	300	350
			5.1						100	150	200	250		
9			5.5						100	150	200	250	300	350
			5.6						100	150	200	250		
			6						100	150	200	250	300	350
			6.1						100	150	200	250		
10			6.5						100	150	200	250	300	350
			6.6						100	150	200	250		
			7						100	150	200	250	300	350
			7.1						100	150	200	250		
11			7.5	7.6					100	150	200	250		
			8						100	150	200	250	300	350
			8.1						100	150	200	250		
14			8.5	8.6					100	150	200	250		
			9						100	150	200	250	300	350
15			9.1	9.5	9.6				100	150	200	250		
			10						100	150	200	250	300	350
			10.1						100	150	200	250		
17			10.5	10.6	11	11.1			100	150	200	250		
			11.5	11.6					100	150	200	250		
			12							150	200	250	300	350

Please take the order for head JIS type EPHJ ($P^{0}_{-0.005}$), EPHJE ($P^{-0.01}_{-0.02}$). P.59

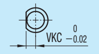
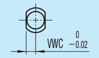
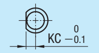
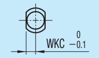
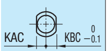
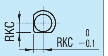
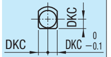
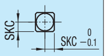
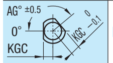
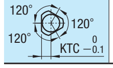
Order
Part Number — L
EPH 1.5 — 150

Days to Ship Quotation

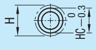
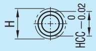
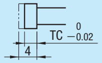
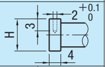
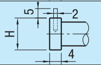
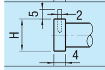
Alterations
Part Number — L — (KC・WKC···etc.)
EPH 2.5 — 150 — TC3.0

Quotation

Alteration details P.53

Alterations	Code	Spec.		1Code
 VKC $^{0}_{-0.02}$	**VKC**	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 VWC $^{0}_{-0.02}$	**VWC**	Precision two flats cutting P/2≦VWC<H/2		
 KC $^{0}_{-0.1}$	**KC**	Single flat cutting P/2≦KC<H/2		
 WKC $^{0}_{-0.1}$	**WKC**	Two flats cutting P/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.1}$	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.1}$	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	**DKC**	Three flats cutting P/2≦DKC<H/2		
 SKC SKC $^{0}_{-0.1}$	**SKC**	Four flats cutting P/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2		

Price Quotation

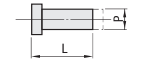
Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	**HC**	HC=0.1mm increments P+1≦HC<H, P≧1.5	Quotation
 H HCC $^{0}_{-0.02}$	**HCC**	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
 TC $^{0}_{-0.02}$ 4	**TC**	TC=0.1mm increments 2.0≦TC<4, P≧1.5 Dimension L becomes shorter by (4-TC)	
 H 3 2 $^{+0.1}_{0}$ 4	**NC**	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
 H 5 2 4	**NCW**	Dowel hole boring+Dowel pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
 H 5 2 4	**NCS**	Dowel hole boring+Dowel pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
217	**NHC**	Numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC not available.	
1 2 3	**NHN**	Automatic sequential numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC not available.	

High Speed Steel
SKH51 equivalent
4mm head

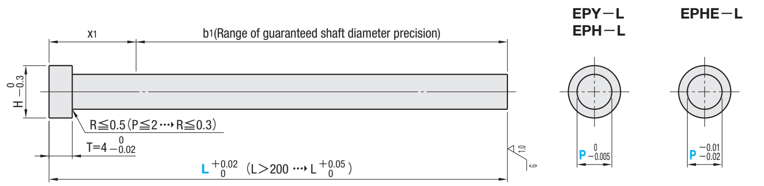
STRAIGHT EJECTOR PINS

— L DIMENSION DESIGNATION TYPE —

L Dimension Designation Type



RoHS



Part Number	Head thickness	T P
EPY—L EPH—L	4mm(T4)	0 −0.005
EPHE—L		−0.01 −0.02

EPY—L is applied with overall quenching(Head without annealing)

Range of guaranteed shaft diameter precision (Details P.1301)
EPY—L ··· x1 max.10
T4 ··· x1 max.30

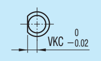
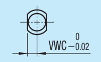
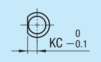
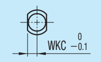
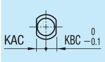
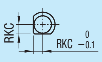
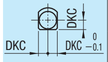
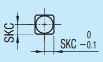
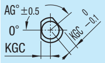
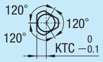
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

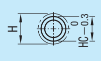
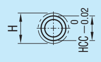
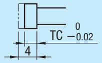
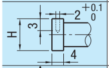
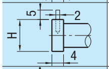
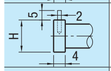
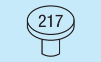
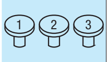
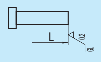
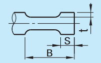
Order Part Number — L
EPH—L5 — 210.00

Days to Ship Quotation

Alterations Part Number — L — (KC・WKC···etc.) Quotation
EPH—L5 — 210.00 — TC3

Alteration details P.53

Alterations	Code	Spec.	1Code
	VKC	Precision single flat cutting P/2≦VKC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Precision two flats cutting P/2≦VWC<H/2	
	KC	Single flat cutting P/2≦KC<H/2	
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	Quotation
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	TC	TC=0.1mm increments 2.0≦TC<4, P≧1.5 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available.	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available.	
	NCS	Dowel hole boring+Dowel pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available.	
	NHC	Numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC not available.	
	TMC	Lapping on the tip face Available when P≧0.6 ⊗ EPY—L not available	
	GVC	S,B=1mm increments 2≦S≦10,S+5≦B≦30 Available when P≧3	

Non JIS material definition is listed on P.1351 - 1352

Price Quotation

H	T	Part Number		L	U/Price
		Type	P	0.01mm increments	1～4
2	4	EPY—L	0.3	20.00～60.00	Quotation
			0.4		
			0.5		
			0.6		
			0.7		
			0.8		
			0.9		
			1		

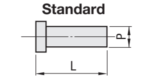
H	T	Part Number		L 0.01mm increments		U/Price					
		Type	P	Lmin.	Lmax.	L40.00～100.00	L100.01～150.00	L150.01～200.00	L200.01～250.00	L250.01～300.00	L300.01～350.00
3	4	EPH—L (P 0 −0.005) EPHE—L (P −0.01 −0.02)	0.3	40.00	60.00	Quotation					
			0.4		100.00						
			0.5								
			0.6 0.7		150.00						
			0.8 0.9								
			1 1.1		200.00						
			1.2 1.3 1.4								
			1.5		250.00						
			1.6								
4			1.7 1.8 1.9		200.00						
			2		300.00						
5			2.1		250.00						
			2.2 2.3 2.4		200.00						
			2.5		300.00						
6			2.6		250.00						
			2.7 2.8 2.9		200.00						
			3		350.00						
7			3.1		250.00						
			3.2 3.3 3.4		200.00						
			3.5		350.00						
			3.6		250.00						
			3.7 3.8 3.9		200.00						
			4		350.00						
8			4.1		250.00						
			4.2 4.3 4.4		200.00						
			4.5		350.00						
			4.6		250.00						
			4.7 4.8 4.9		200.00						
			5		350.00						
			5.1		250.00						
9			5.5		350.00						
			5.6		250.00						
			6		350.00						
			6.1		250.00						
10			6.5		350.00						
			6.6		250.00						
			7		350.00						
			7.1		250.00						
11			7.5								
			7.6								
			8		350.00						
			8.1		250.00						
14			8.5 8.6								
			9		350.00						
15			9.1		250.00						
			9.5 9.6								
			10		350.00						
17			10.1		250.00						
			10.5 10.6								
			11 11.1								
			11.5 11.6								
			12		350.00						

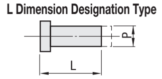
When the ejector pin's dimension L is less than 40mm, the length of b1 (guaranteed shaft diameter precision range) may be too short for your particular application. For such application, use EPY—L or core pins instead.
Please take the order for JIS head type EPHJ—L (P 0 −0.005) / EPHJE—L (P −0.01 −0.02). P.59

High Speed Steel
SKH51
equivalent
JIS head

STRAIGHT EJECTOR PINS

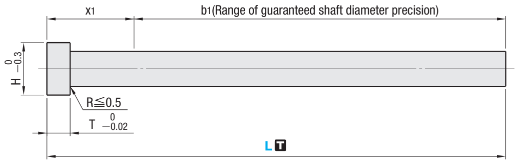
—STANDARD／L DIMENSION DESIGNATION TYPE—

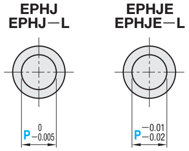


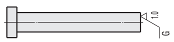


Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Shapes	Head thickness	T L	T P	Tip Face Roughness
EPHJ	Standard	6・8mm (JIS)	$^{+5}_{+0.1}$	$^{\ 0}_{-0.005}$	—
EPHJE				$^{-0.01}_{-0.02}$	
EPHJ−L	L Dimension Designation Type		$^{+0.02}_{\ 0}$ L＞200 ⋯› $^{+0.05}_{\ 0}$	$^{\ 0}_{-0.005}$	
EPHJE−L				$^{-0.01}_{-0.02}$	

Range of guaranteed shaft diameter precision (Details P.1301)
JIS ⋯› x1 max.35

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

■Standard

H	T	Part Number		L					
		Type	P	Selection					
8	6	**EPHJ** (P$^{\ 0}_{-0.005}$) **EPHJE** (P$^{-0.01}_{-0.02}$)	4	100	150	200	250	300	
			4.5	100	150	200	250	300	
9			5	100	150	200	250	300	350
			5.5	100	150	200	250	300	350
10			6	100	150	200	250	300	350
11			6.5	100	150	200	250	300	350
			7	100	150	200	250	300	350
13	8		8	100	150	200	250	300	350
14			9	100	150	200	250	300	350
15			10	100	150	200	250	300	350
17			12		150	200	250	300	350

For JIS head type less than P4 is T=4, please place the order for 4mm head type of EPH (P$^{\ 0}_{-0.005}$) / EPHE−B (P$^{-0.01}_{-0.02}$) P.55

■L Dimension Designation Type

H	T	Part Number		L
		Type	P	0.01mm increments
8	6	**EPHJ−L** (P$^{\ 0}_{-0.005}$) **EPHJE−L** (P$^{-0.01}_{-0.02}$)	4	40.00～300.00
			4.5	
9			5	40.00～350.00
			5.5	
10			6	
11			6.5	
			7	
13	8		8	
14			9	
15			10	
17			12	

For JIS head type less than P4 is T=4, please place the order for 4mm head type of EPH−L (P$^{\ 0}_{-0.005}$) / EPHE−L (P$^{-0.01}_{-0.02}$) P.57

Order

Part Number	—	L
EPHJ4	—	200
EPHJ−L5	—	210.00

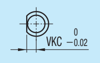
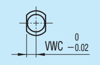
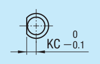
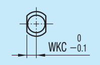
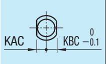
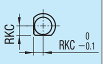
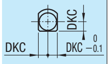
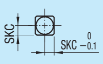
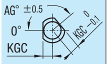
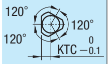
Days to Ship **Quotation**

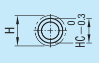
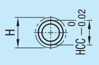
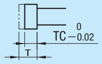
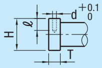
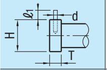
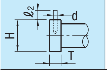
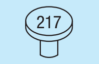
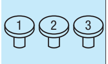
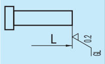
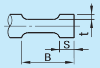
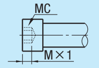
Alterations

Part Number	—	L	—	(KC・WKC⋯etc.)
EPHJ4	—	200	—	TC3.0
EPHJ−L5	—	210.00	—	TC5

Quotation

Alteration details P.53

Alterations	Code	Spec.		1Code
	**VKC**	Precision single flat cutting P/2≦VKC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	**Quotation**
	**VWC**	Precision two flats cutting P/2≦VWC＜H/2		
	**KC**	Single flat cutting P/2≦KC＜H/2		
	**WKC**	Two flats cutting P/2≦WKC＜H/2		
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	**RKC**	Two flats (right angled) cutting P/2≦RKC＜H/2		
	**DKC**	Three flats cutting P/2≦DKC＜H/2		
	**SKC**	Four flats cutting P/2≦SKC＜H/2		
	**KGC**	Two flats (angled) cutting P/2≦KGC＜H/2 AG=1° increments 0＜AG＜360		
	**KTC**	Three flats cutting at 120° P/2≦KTC＜H/2		

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC＜H	
	**HCC**	HCC=0.1mm increments P+1≦HCC＜H−0.3	
	**TC**	TC=0.1mm increments T/2≦TC＜T EPHJ,EPHJE ⋯› Dimension L becomes shorter by (T-TC). EPHJ-L,EPHJE-L ⋯› T−TC≦Lmax.−L (Dimension L remains unchanged.)	
	**NC**	Dowel hole boring ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T 6, 8 / d 3 / ℓ 5	**Quotation**
	**NCW**	Dowel hole boring+ Spring pin driving ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T 6, 8 / d 3 / ℓ1 5	
	**NCS**	Dowel hole boring+ Dowel pin driving ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T 6, 8 / d 3 / ℓ2 5	
	**NHC**	Numbering on the head How to order P.54 ⊗ Combination with SKC・MC not available	
	**NHN**	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC・MC not available	
	**TMC**	Lapping on the tip face Available for L dimension designation type only	
	**GVC**	S,B=1mm increments 2≦S≦10,S+5≦B≦30 Available for L dimension designation type only	
	**MC**	Head tapping Available when P≧8 ⊗ Combination with other than TMC・GVC not available. P 8・9 / M M4 P 10 / M M5 P 12 / M M6	

Price **Quotation**

Straight Ejector Pins

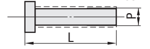
High Speed Steel SKH51 equivalent

High Speed Steel
SKH51
equivalent

STRAIGHT EJECTOR PINS

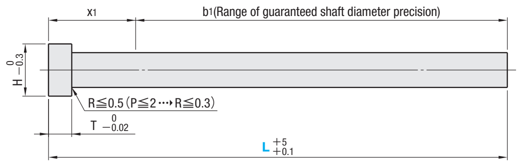
—P DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE—

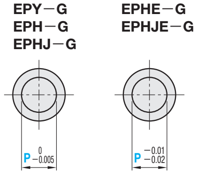
P dimension designation・L dimension selection type



ⓘ Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Head thickness	T P
EPY—G	4mm(T4)	$^{0}_{-0.005}$
EPH—G		
EPHJ—G	6・8mm(JIS)	
EPHE—G	4mm(T4)	$^{-0.01}_{-0.02}$
EPHJE—G	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (Details ☞ **P.1301**)

Head thickness	L	x1 max.
T4 (Small diameter)	60	10
T4	100～200	30
JIS	100～200	35
T4・JIS	250	110
	300	160
	350	210

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details ☞ **P.1303**)
EPY—G is applied with overall quenching
(Head without annealing)

H	T	Part Number		L	P
		Type	No.		0.005mm increments
2	4	EPY—G	0.4	60	0.300～0.395
			0.5		0.400～0.495
			0.6		0.500～0.595
			0.7		0.600～0.695
			0.8		0.700～0.795
			0.9		0.800～0.895
			1		0.900～0.995

4mm head		JIS head		Part Number			L	P
H	T	H	T	Type		No.	Selection	0.01mm increments
				4mm head	JIS head			
3	4	—	—	EPH—G ($P^{0}_{-0.005}$) EPHE—G ($P^{-0.01}_{-0.02}$)	—	0.5	100	0.40～ 0.49
						0.6		0.50～ 0.59
						0.7		0.60～ 0.69
						0.8	100 150	0.70～ 0.79
						0.9		0.80～ 0.89
						1	100 150 200	0.90～ 0.99
						1.5		1.00～ 1.49
4						2	100 150 200 250	1.50～ 1.99
5						2.5	100 150 200 250 300	2.00～ 2.49
6						3		2.50～ 2.99
7						3.5		3.00～ 3.49
		8	6		EPHJ—G ($P^{0}_{-0.005}$) EPHJE—G ($P^{-0.01}_{-0.02}$)	4		3.50～ 3.99
8						4.5	100 150 200 250 300 (350)	4.00～ 4.49
		9				5	100 150 200 250 300 350	4.50～ 4.99
9						5.5		5.00～ 5.49
		10				6		5.50～ 5.99
10		11				6.5		6.00～ 6.49
						7		6.50～ 6.99
11		13	8			8		7.00～ 7.99
15		15				10		8.00～ 9.99
17		17				12		10.00～11.99

ⓘ The L dimension enclosed in brackets ( ) is applicable only for EPH-G and EPHE-G.
ⓘ For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPH—G ($P^{0}_{-0.005}$) / EPHE—G ($P^{-0.01}_{-0.02}$)
ⓘ When L dimension is 250 or more, make sure to check the range of guaranteed shaft diameter precision. (Details ☞ **P.1301**)

Order

Part Number	—	L	—	P
EPH—G 5	—	350	—	P4.72

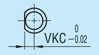
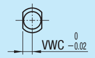
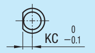
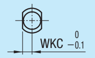
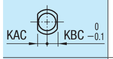
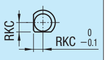
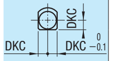
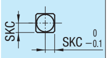
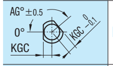
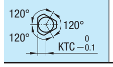
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	(KC・WKC…etc.)
EPH—G 5	—	350	—	P4.72	—	KC2.5

Quotation

Alteration details ☞ P.53

Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting P/2≦VKC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible EPY—G only 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Precision two flats cutting P/2≦VWC＜H/2		
	KC	Single flat cutting P/2≦KC＜H/2		
	WKC	Two flats cutting P/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2		
	DKC	Three flats cutting P/2≦DKC＜H/2		
	SKC	Four flats cutting P/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 AG=1° increments 0＜AG＜360		
	KTC	Three flats cutting at 120° P/2≦KTC＜H/2		

<table>
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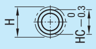
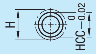
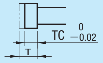
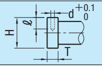
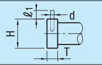
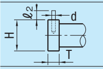
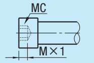
<tr><td> </td><td>HC</td><td>HC=0.1mm increments
ⓘ P+1≦HC＜H, P≧1.5</td><td>Quotation</td></tr>
<tr><td> </td><td>HCC</td><td>HCC=0.1mm increments
ⓘ P+1≦HCC＜H−0.3, P≧1.5</td><td></td></tr>
<tr><td> </td><td>TC</td><td>TC=0.1mm increments
ⓘ T/2≦TC＜T, P≧1.5
Dimension L becomes shorter by (T−TC)</td><td></td></tr>
<tr><td> </td><td>NC</td><td>Dowel hole boring
ⓘ Available when H≧4
⊗ Combination with other than NHC・NHN not available.<table><tr><th>T</th><th>d</th><th>ℓ</th></tr><tr><td>4</td><td>2</td><td>3</td></tr><tr><td>6</td><td rowspan="2">3</td><td rowspan="2">5</td></tr><tr><td>8</td></tr></table></td><td></td></tr>
<tr><td> </td><td>NCW</td><td>Dowel hole boring+Spring pin driving
ⓘ Available when H≧4
⊗ Combination with other than NHC・NHN not available.<table><tr><th>T</th><th>d</th><th>ℓ1</th></tr><tr><td>4</td><td>2</td><td rowspan="3">5</td></tr><tr><td>6</td><td rowspan="2">3</td></tr><tr><td>8</td></tr></table></td><td></td></tr>
<tr><td> </td><td>NCS</td><td>Dowel hole boring+Dowel pin driving
ⓘ Available when H≧4
⊗ Combination with other than NHC・NHN not available.<table><tr><th>T</th><th>d</th><th>ℓ2</th></tr><tr><td>4</td><td>2</td><td rowspan="3">5</td></tr><tr><td>6</td><td rowspan="2">3</td></tr><tr><td>8</td></tr></table></td><td></td></tr>
<tr><td> </td><td>NHC</td><td>Numbering on the head
How to order ☞ P.54
ⓘ Available when H≧2
⊗ Combination with SKC・MC not available.</td><td></td></tr>
<tr><td> </td><td>NHN</td><td>Automatic sequential numbering on the head
How to order ☞ P.54
ⓘ Available when H≧2
⊗ Combination with SKC・MC not available.</td><td></td></tr>
<tr><td> </td><td>MC</td><td>Head tapping
ⓘ Available for EPHJ—G・EPHJE—G when P≧8.00
⊗ Combination with any other alteration not available.<table><tr><th>P</th><th>M</th></tr><tr><td>P 8.00～ 9.99</td><td>M4</td></tr><tr><td>P10.00～11.99</td><td>M5</td></tr></table></td><td></td></tr>
</table>

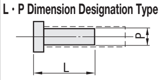
Price Quotation

High Speed Steel
SKH51
equivalent

STRAIGHT EJECTOR PINS

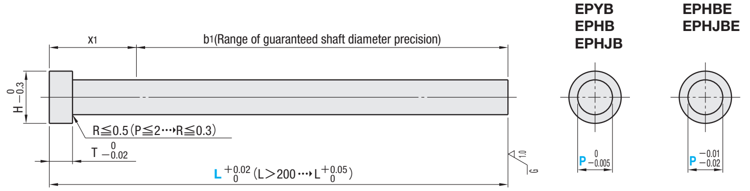
—L・P DIMENSION DESIGNATION TYPE—

L・P Dimension Designation Type



Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number	Head thickness	T P
EPYB	4mm(T4)	$^{0}_{-0.005}$
EPHB		
EPHJB	6・8mm(JIS)	
EPHBE	4mm(T4)	$^{-0.01}_{-0.02}$
EPHJBE	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (Details P.1301)

Head thickness	L	x1 max.
T4 (Small diameter)	20.00～ 60.00	10
T4	40.00～200.00	30
JIS	40.00～200.00	35
T4・JIS	200.01～250.00	110
	250.01～300.00	160
	300.01～350.00	210

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details P.1303)
EPYB is applied with overall quenching
(Head without annealing)

H	T	Part Number Type	No.	L 0.01mm increments	P 0.005mm increments
2	4	**EPYB**	0.4	20.00～60.00	0.300 ～ 0.395
			0.5		0.400 ～ 0.495
			0.6		0.500 ～ 0.595
			0.7		0.600 ～ 0.695
			0.8		0.700 ～ 0.795
			0.9		0.800 ～ 0.895
			1		0.900 ～ 0.995

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	No.	0.01mm increments L	0.01mm increments P
3	4	—	—	**EPHB** (P$^{0}_{-0.005}$) **EPHBE** (P$^{-0.01}_{-0.02}$)	—	0.5	40.00～100.00	0.40～ 0.49
						0.6		0.50～ 0.59
						0.7		0.60～ 0.69
						0.8	40.00～150.00	0.70～ 0.79
						0.9		0.80～ 0.89
						1	40.00～200.00	0.90～ 0.99
						1.5		1.00～ 1.49
4						2	40.00～250.00	1.50～ 1.99
5						2.5	40.00～300.00	2.00～ 2.49
6						3		2.50～ 2.99
7						3.5		3.00～ 3.49
		8	6		**EPHJB** (P$^{0}_{-0.005}$) **EPHJBE** (P$^{-0.01}_{-0.02}$)	4		3.50～ 3.99
8						4.5	40.00～300.00(350.00)	4.00～ 4.49
		9				5	40.00～350.00	4.50～ 4.99
9						5.5		5.00～ 5.49
		10				6		5.50～ 5.99
10		11				6.5		6.00～ 6.49
						7		6.50～ 6.99
11		13	8			8		7.00～ 7.99
15		15				10		8.00～ 9.99
17		17				12		10.00～11.99

- The L dimension enclosed in brackets ( ) is applicable only for EPHB and EPHBE.
- For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPHB (P$^{0}_{-0.005}$) / EPHBE (P$^{-0.01}_{-0.02}$)
- When L dimension is 200.01 or more, make sure to check the range of guaranteed shaft diameter precision. (Details P.1301)
- When the ejector pin's dimension L is less than 40, the guaranteed shaft diameter precision range may be too short for your particular application. For such application, use EPYB or core pins instead.

Order

Part Number	—	L	—	P
EPHJB 5	—	350.00	—	P4.72

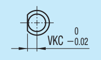
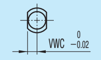
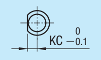
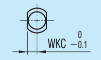
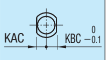
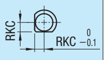
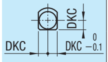
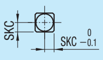
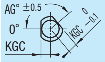
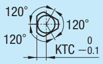
Days to Ship **Quotation**

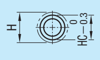
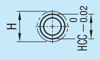
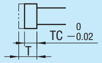
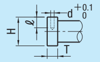
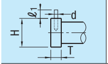
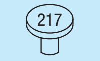
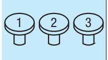
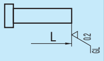
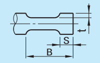
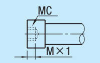
Alterations

Part Number	—	L	—	P	—	(KC・WKC…etc.)
EPHJB 5	—	350.00	—	P4.72	—	KC2.5

Quotation

Alteration details P.53

Alterations	Code	Spec.		1Code
	**VKC**	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible EPYB only 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	**Quotation**
	**VWC**	Precision two flats cutting P/2≦VWC<H/2		
	**KC**	Single flat cutting P/2≦KC<H/2		
	**WKC**	Two flats cutting P/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2		
	**DKC**	Three flats cutting P/2≦DKC<H/2		
	**SKC**	Four flats cutting P/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC<H, P≧1.5	**Quotation**
	**HCC**	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	**TC**	TC=0.1mm increments T/2≦TC<T, P≧1.5 (Dimension L remains unchanged.) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ: 4 / 2 / 3; 6 / 3 / 5; 8 / 3 / 5	
	**NCW**	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ1: 4 / 2 / 5; 6 / 3 / 5; 8 / 3 / 5	
	**NHC**	Numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC・MC not available.	
	**NHN**	Automatic sequential numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC・MC not available.	
	**TMC**	Lapping on the tip face Available when P≧0.6 ⊗ Not availabe for EPYB.	
	**GVC**	S,B=1mm increments 2≦S≦10,S+5≦B≦30 Available when P≧3	
	**MC**	Head tapping Available for EPHJB・EPHJBE when P≧8.00 ⊗ Combination with other than TMC・GVC not available. P / M: P 8.00～ 9.99 / M4; P10.00～11.99 / M5	

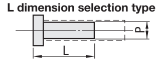
Price **Quotation**

High Speed Steel
SKH51 equivalent
4mm head

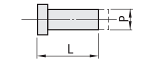
EXTRA PRECISION STRAIGHT EJECTOR PINS

—P DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE／L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION TYPE—

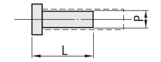
P dimension designation・L dimension selection type



L dimension designation type

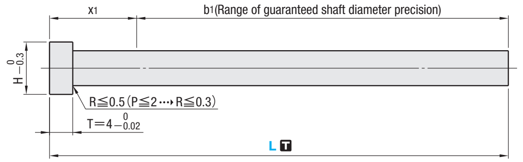


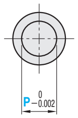
L・P dimension designation type

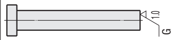


Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number		Head thickness	T L	T P	Tip Face Roughness
EPV—G	(P dimension designation・L dimension selection type)	4mm(T4)	$^{+5}_{+0.1}$	$^{\ 0}_{-0.002}$	—
EPV—L	(L dimension designation type)		$^{+0.01}_{\ 0}$		
EPVB	(L・P dimension designation type)				

The heads of extra precision straight ejector pins are not annealed in order to guarantee precision. Use a construction that supports sliding and does not readily apply a load to the flange of the ejector pin, such as by using a precision ejector guide pin&bushing.

Range of guaranteed shaft diameter precision (Details P.1301)

P	x1 max.
0.3～0.799	10
0.8～5	30

M SKH51 equivalent
H 58～60HRC

Range of guaranteed base material hardness (Details P.1303)
Applied with overall quenching
(Head without annealing)

■P Dimension Designation・L Dimension Selection Type

H	T	Part Number		L	P
		Type	No.		0.001mm increments
2	4	EPV—G	0.4	60	0.300～0.399
3			0.5	60 100	0.400～0.499
			0.6		0.500～0.599
			0.7		0.600～0.699
			0.8		0.700～0.799
			0.9	60 100 150	0.800～0.899
			1		0.900～0.999
			1.5		1.000～1.499
4			2	100 150	1.500～1.999
5			2.5		2.000～2.499
6			3		2.500～2.999
7			3.5		3.000～3.499
			4		3.500～3.999
8			4.5		4.000～4.499
			5		4.500～4.999

The figure for H dimension is 2 when P<0.4.

■L・P Dimension Designation Type

H	T	Part Number		L	P
		Type	No.	0.01mm increments	0.001mm increments
2	4	EPVB	0.4	20.00～ 60.00	0.300～0.399
3			0.5	30.00～100.00	0.400～0.499
			0.6		0.500～0.599
			0.7		0.600～0.699
			0.8		0.700～0.799
			0.9	50.00～150.00	0.800～0.899
			1		0.900～0.999
			1.5		1.000～1.499
4			2		1.500～1.999
5			2.5		2.000～2.499
6			3		2.500～2.999
7			3.5		3.000～3.499
			4		3.500～3.999
8			4.5		4.000～4.499
			5		4.500～4.999

The figure for H dimension is 2 when P<0.4.

■L Dimension Designation Type

H	T	Part Number		L
		Type	P	0.01mm increments
2	4	EPV—L	*0.3	20.00～ 60.00
			*0.4	
3			0.5	30.00～100.00
			0.6	
			0.7	
			0.8	50.00～150.00
			0.9	
			1	
			1.5	
4			2	
5			2.5	
6			3	
7			3.5	
			4	
8			4.5	
			5	

*The figure for H dimension is 2 for P dimensions 0.3 or 0.4.

Order

Part Number	—	L	—	P
EPV—G 2	—	150	—	P1.725
EPV—L 2	—	150.00		

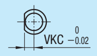
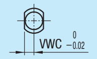
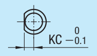
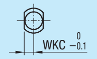
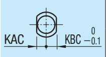
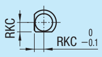
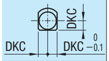
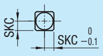
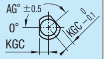
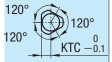
Days to Ship Quotation

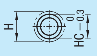
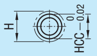
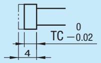
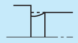
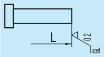
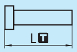
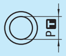
Alterations

Part Number	—	L	—	P	—	(KC・WKC···etc.)
EPV—L 2	—	150.00			—	KC1.5

Quotation

Alteration details P.53

Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation EPV—G・EPVB 0.0005mm increments possible EPV—L 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	VWC	Precision two flats cutting P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	HCC	HCC=0.1mm increments P+1≦HCC<H—0.3, P≧1.5	
	TC	TC=0.1mm increments 2.0≦TC<4,P≧1.5 4—TC≦Lmax.—L EPV—G ··· Dimension L becomes shorter by (4-TC). EPV—L, EPVB ··· (Dimension L remains unchanged.)	
	TRN	Relief under the head Available when P≧0.6	Quotation
	NHC	Numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 Available when H≧2 ⊗ Combination with SKC not available.	
	TMC	Lapping on the tip face Available when P≧0.6 Available when EPV—L・EPVB	
	LKC	Changes L dimension tolerance. L $^{+0.01}_{\ 0}$ ··· $^{+0.005}_{\ 0}$ (L designation in 0.005mm increments possible) Available when 1.5≦P≦5 Available when EPV—L・EPVB	
	PKC	Shaft diameter tolerance alteration (range alteration) P $_{-0.002}^{\ 0}$ ··· $_{-0.003}^{-0.001}$	

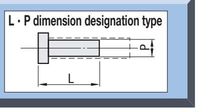
Price Quotation

High Speed Steel
SKH51 equivalent
+
Hard chromate plating

STRAIGHT EJECTOR PINS

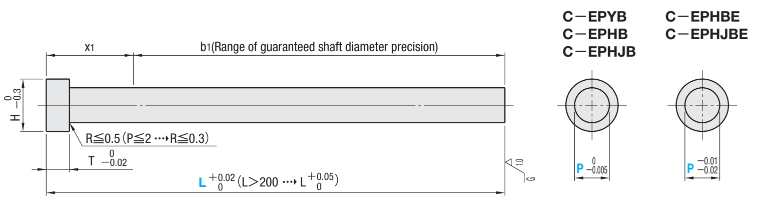
—L・P DIMENSION DESIGNATION TYPE—

L・P dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number	Head thickness	T P
C−EPYB (Small diameter)	4mm(T4)	$^{0}_{-0.005}$
C−EPHB		
C−EPHJB	6・8mm(JIS)	
C−EPHBE	4mm(T4)	$^{-0.01}_{-0.02}$
C−EPHJBE	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (Details P.1301)

Head thickness	L	x_1 max.
T4(Small diameter)	20.00～ 60.00	10
T4	40.00～200.00	30
JIS	40.00～200.00	35
T4 ・ JIS	200.01～250.00	110
	250.01～300.00	160
	300.01～350.00	210

- Tolerances of shaft diameter/lenth are values after plating.
- Plating may extend to the head.

M SKH51 equivalent+Hard chromate plating
H Surface:900HV～(Referance value)
Base materials:58～60HRC
Range of guaranteed base material hardness (Details P.1303)
C-EPYB is applied with overall quenching
(Head without annealing)

H	T	Part Number		L	P	U/Price
		Type	No.	0.01mm increments	0.005mm increments	1～4 pcs.
2	4	**C−EPYB**	0.4	20.00～60.00	0.300～0.395	Quotation
			0.5		0.400～0.495	
			0.6		0.500～0.595	
			0.7		0.600～0.695	
			0.8		0.700～0.795	
			0.9		0.800～0.895	
			1		0.900～0.995	

4mm head		JIS head		Part Number			0.01mm increments	
				Type				
H	T	H	T	4mm head	JIS head	No.	L	P
3	4	—	—	**C−EPHB** ($P^{0}_{-0.005}$)	—	0.5	40.00～100.00	0.40～ 0.49
						0.6		0.50～ 0.59
						0.7		0.60～ 0.69
						0.8	40.00～150.00	0.70～ 0.79
						0.9		0.80～ 0.89
						1	40.00～200.00	0.90～ 0.99
						1.5		1.00～ 1.49
4						2	40.00～250.00	1.50～ 1.99
5						2.5	40.00～300.00	2.00～ 2.49
6						3		2.50～ 2.99
7						3.5		3.00～ 3.49
		8	6	**C−EPHBE** ($P^{-0.01}_{-0.02}$)	**C−EPHJB** ($P^{0}_{-0.005}$) **C−EPHJBE** ($P^{-0.01}_{-0.02}$)	4		3.50～ 3.99
8						4.5	40.00～300.00(350.00)	4.00～ 4.49
		9				5	40.00～350.00	4.50～ 4.99
9						5.5		5.00～ 5.49
		10				6		5.50～ 5.99
10		11				6.5		6.00～ 6.49
						7		6.50～ 6.99
11		13	8			8		7.00～ 7.99
15		15				10		8.00～ 9.99
17		17				12		10.00～11.99

- The L dimension enclosed in brackets ( ) is applicable only for C-EPHB and C-EPHBE.
- For JIS head type less than No.4 is T=4, please place the order for 4mm head type of C−EPHB ($P^{0}_{-0.005}$) / C−EPHBE ($P^{-0.01}_{-0.02}$)
- When L dimension is 200.01 or more, make sure to check the range of guaranteed shaft diameter precision. (Details P.1301)
- When the ejector pin's dimension L is less than 40, the guaranteed shaft diameter precision range may be too short for your particular application. For such application, use C−EPYB or core pins instead.

Order

Part Number	L	P
C−EPHJB 5	350.00	P4.72

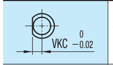
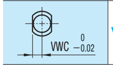
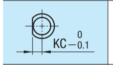
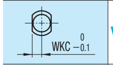
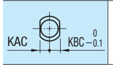
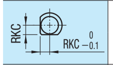
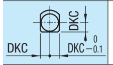
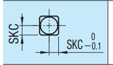
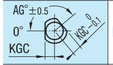
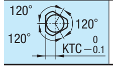
Days to Ship Quotation

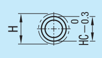
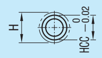
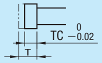
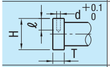
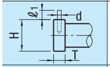
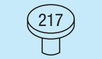
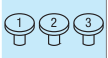
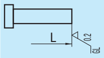
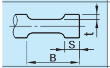
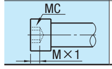
Alterations

Part Number	L	P	(KC・WKC···etc.)
C−EPHJB 5	350.00	P4.72	KC2.5

Quotation

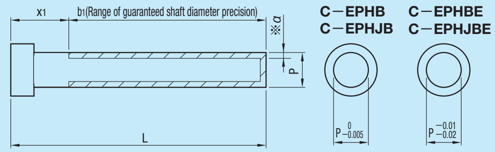
Alteration details P.53

Alterations	Code	Spec.		1Code
	**VKC**	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible C-EPYB only 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	**VWC**	Precision two flats cutting P/2≦VWC<H/2		
	**KC**	Single flat cutting P/2≦KC<H/2		
	**WKC**	Two flats cutting P/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2		
	**DKC**	Three flats cutting P/2≦DKC<H/2		
	**SKC**	Four flats cutting P/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	**HCC**	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	**TC**	TC=0.1mm increments T/2≦TC<T, P≧1.5 (Dimension L remains unchanged.) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T 4: d 2, ℓ 3 T 6, 8: d 3, ℓ 5	
	**NCW**	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T 4: d 2 T 6, 8: d 3 ℓ_1 5	Quotation
	**NHC**	Numbering on the head How to order P.54 Available when H≧2 Combination with SKC・MC not available.	
	**NHN**	Automatic sequential numbering on the head How to order P.54 Available when H≧2 Combination with SKC・MC not available.	
	**TMC**	Lapping on the tip face Not available for C−EPYB Available when P≧0.6 Hard chromate plating is applied after alternations.	
	**GVC**	S,B=1mm increments 2≦S≦10,S+5≦B≦30 Available when P≧3 Hard chromate plating is applied after alternations.	
	**MC**	Head tapping Available for C−EPHJB・C−EPHJBE when P≧8.00 Combination with other than TMC・GVC not available. P 8.00～ 9.99: M4 P10.00～11.99: M5	

Price Quotation

■Hard chromate plating on ejector pins



Hard chromate plating for hardness 900 HV or higher is applied to base materials of SKH51 equivalent for improvement of wear resistance.
The thickness of a plating layer of one side (α) is between 0.001 and 0.002mm (reference value). By processing a shaft diameter of a base material to be thin in consideration of such thickness, shaft diameter precision is guaranteed after plating.
The range of guaranteed plating layer covers the b1 dimension section; however plating may extend to the head as it is applied after machining dimension L/P.

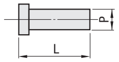
- The tip surface is plated.

Since the plating layer is too thin for surface hardness testing after plating, the data shown in this catalog are "reference values."

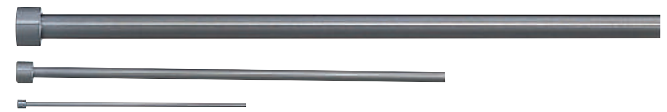
Dies Steel
SKD61 equivalent
+
Nitriding

STRAIGHT EJECTOR PINS

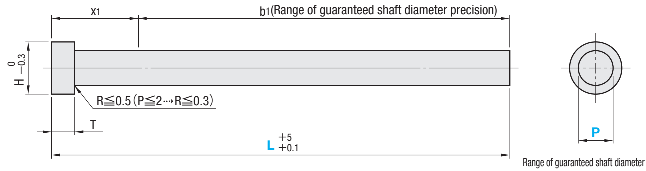
—STANDARD—



Non JIS material definition is listed on P.1351 - 1352



RoHS



Range of guaranteed shaft diameter precision (Details P.1301)
T4 ···› x1 max.30
JIS ···› x1 max.35

Part Number	Head thickness	T T
EPN	4mm(T4)	0 −0.02
EPJ	6・8mm (JIS)	0 −0.05

T P

L \ P	1～13	15～20	25
L≦500	−0.01 −0.02	−0.01 −0.03	−0.01 −0.04
L≧600	−0.01 −0.03	−0.01 −0.03	−0.01 −0.05

M SKD61 equivalent+Nitrided
H Surface base:900HV～
Base material:40～45HRC
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

4mm head		JIS head		Part Number			L
H	T	H	T	Type		P	Selection
				4mm head	JIS head		
3	4	—	—	EPN	—	1 1.1 1.2 1.3 1.4	100 150
						1.5	100 150 200
4						1.6 1.7 1.8 1.9	100 150 200
						2	100 150 200 250 300 350 400
5						2.1 2.2 2.3 2.4	100 150 200 250 300
						2.5	100 150 200 250 300 350 400
6						2.6 2.7 2.8 2.9	100 150 200 250 300
						3	100 150 200 250 300 350 400 450 500
7						3.1 3.2 3.3 3.4	100 150 200 250 300 350 400
						3.5	100 150 200 250 300 350 400 450 500
						3.6 3.7 3.8 3.9	100 150 200 250 300 350 400
		8	6		EPJ	4	100 150 200 250 300 350 400 (500)
8						(4.1) (4.2) (4.3) (4.4)	200 300 400
						4.5	100 150 200 250 300 350 400 (500)
		9				(4.6) (4.7) (4.8) (4.9)	200 300 400
						5	100 150 200 250 300 350 400 500 (600)
9						(5.1) (5.2) (5.3) (5.4)	200 300 400
						5.5	100 150 200 250 300 350 400 500
		10				(5.6) (5.7) (5.8) (5.9)	200 300 400
						6	100 150 200 250 300 350 400 500 (600) (700)
10		11				(6.1) (6.2) (6.3) (6.4)	200 300 400
						6.5	100 150 200 250 300 350 400 500 (600) (700)
						7	100 150 200 250 300 350 400 500 (600) (700) (800) (900) (1000)
11		13	8			8	100 150 200 250 300 350 400 (450) 500 (600) (700) (800) (900) (1000)
15		15				10	100 150 200 250 300 350 400 (450) 500 (600) (700) (800) (900) (1000)
17		17				12	100 150 200 250 300 350 400 (450) 500 (600) (700) (800) (900) (1000)
18		18				(13)	100 150 200 250 300 350 400 500
20		20				15	100 150 200 250 300 350 400 (450) 500 (600) (700) (800) (900) (1000)
21		21				16	100 150 200 250 300 350 400 500 (600) (700) (800) (900) (1000)
—	—	25		—		20	150 200 250 300 400 500 600 700 800 900 1000
		30				25	200 300 400 500 600 700 800 900 1000

The P dimension enclosed in brackets ( ) is applicable only for EPN.
The L dimension enclosed in brackets ( ) is applicable only for EPJ.

Order

Part Number	—	L
EPN 3	—	100

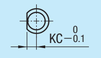
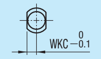
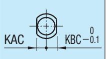
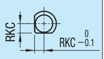
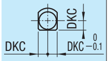
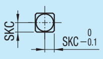
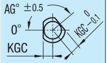
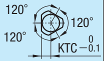
Days to Ship Quotation

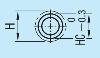
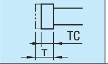
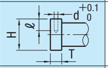
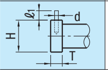
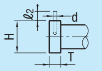
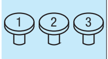
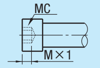
Alterations

Part Number	—	L	—	(KC・WKC···etc.)
EPN 16	—	500	—	NC

Quotation

Alteration details P.53

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		Quotation
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 Dimension L becomes shorter by (T−TC)	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN not available. T 4 6 8 / d 2 3 3 / ℓ 3 5 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN not available. T 4 6 8 / d 2 3 3 / ℓ1 5 5 5	Quotation
	NCS	Dowel hole boring+Dowel pin driving Available when H≧4 Combination with other than NHC・NHN not available. T 4 6 8 / d 2 3 3 / ℓ2 5 5 5	
	NHC	Numbering on the head How to order P.54 Combination with SKC・MC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 Combination with SKC・MC not available.	
	MC	Head tapping Available for EPJ when P≧8 Combination with any other alteration not available. P 8 / 10 / 12・15 / 16～25 M M4 / M5 / M6 / M8	

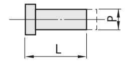
Price Quotation

Dies Steel
SKD61 equivalent
+
Nitriding

STRAIGHT EJECTOR PINS

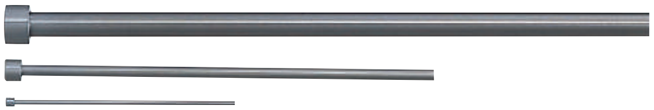
—L DIMENSION DESIGNATION TYPE—

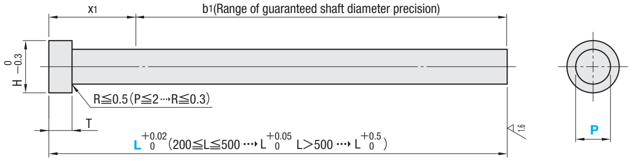
L dimension designation type



❗ Non JIS material definition is listed on P.1351 - 1352

RoHS




x1
b1(Range of guaranteed shaft diameter precision)
H 0 −0.3
R≦0.5(P≦2···R≦0.3)
T
L +0.02 0 (200≦L≦500 ···L +0.05 0 L>500 ···L +0.5 0)
1.6
P

Range of guaranteed shaft diameter precision (Details ☞ **P.1301**)
T4 ··· x1 max.30
JIS ··· x1 max.35

Part Number	Head thickness	**T** T
EPN—L	4mm(T4)	0 −0.02
EPJ—L	6・8mm(JIS)	0 −0.05

T P

L \ P	1～13	15～20	25
L≦500	−0.01 −0.02	−0.01 −0.03	−0.01 −0.04
L>500	−0.01 −0.03	−0.01 −0.03	−0.01 −0.05

M SKD61 equivalent+Nitrided
H Surface base:900HV～
Base material:40～45HRC
Range of guaranteed base material hardness (Details ☞ **P.1303**)
Range of guaranteed surface hardness for nitriding (Details ☞ **P.1303**)

4mm head		JIS head		Part Number			L
H	T	H	T	Type		P	0.01mm increments (When L>500, then 0.1mm increments)
				4mm head	JIS head		
3	4	—	—	EPN—L	—	1 1.1 1.2 1.3 1.4	40.00～150.00
						1.5	40.00～200.00
4						1.6 1.7 1.8 1.9	
						2	40.00～400.00
5						2.1 2.2 2.3 2.4	40.00～300.00
						2.5	40.00～400.00
6						2.6 2.7 2.8 2.9	40.00～300.00
						3	40.00～500.00
7						3.1 3.2 3.3 3.4	40.00～400.00
						3.5	40.00～500.00
						3.6 3.7 3.8 3.9	40.00～400.00
		8	6		EPJ—L	4	40.00～400.00 (500.0)
8						(4.1) (4.2) (4.3) (4.4)	
						4.5	
		9				(4.6) (4.7) (4.8) (4.9)	
						5	40.00～500.00 (600.0)
9						(5.1) (5.2) (5.3) (5.4)	40.00～400.00
						5.5	40.00～500.00
		10				(5.6) (5.7) (5.8) (5.9)	40.00～400.00
						6	40.00～500.00 (700.0)
10		11				(6.1) (6.2) (6.3) (6.4)	40.00～400.00
						6.5	40.00～500.00 (700.0)
						7	40.00～500.00 (1000.0)
11		13	8			8	
15		15				10	
17		17				12	40.00～500.00 (1000.0)
18		18				(13)	
20		20				15	
21		21				16	
—	—	25		—		20	40.00～1000.00
		30				25	

❗ The P dimension enclosed in brackets ( ) is applicable only for EPN—L.
❗ The L dimension enclosed in brackets ( ) is applicable only for EPJ—L.

Order

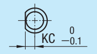
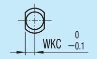
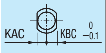
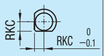
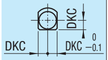
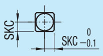
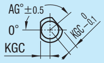
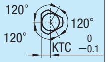
Part Number	—	L
EPN—L 3	—	125.55

Days to Ship **Quotation**

Alterations

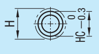
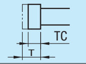
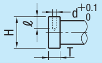
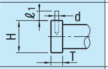
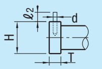
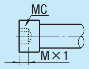
Part Number	—	L	—	(KC・WKC···etc.)
EPN—L 4.5	—	225.55	—	WKC2.25

Quotation

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	**Quotation**
	**WKC**	Two flats cutting P/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2		
	**DKC**	Three flats cutting P/2≦DKC<H/2		
	**SKC**	Four flats cutting P/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2		

Price **Quotation**

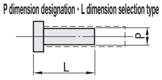
Alteration details ☞ **P.53**

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments ❗ P+1≦HC<H, P≧1.5	
	**TC**	TC=0.1mm increments ❗ T/2≦TC<T, P≧1.5 (Dimension L remains unchanged) ❗ T—TC≦Lmax.—L	
	**NC**	Dowel hole boring ❗ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ 4 2 3 6 3 5 8	**Quotation**
	**NCW**	Dowel hole boring+Spring pin driving ❗ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ_1 4 2 5 6 3 8	
	**NCS**	Dowel hole boring+Dowel pin driving ❗ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ_2 4 2 5 6 3 8	
	NHC	Numbering on the head How to order ☞ **P.54** ⊗ Combination with SKC・MC not available.	
	NHN	Automatic sequential numbering on the head How to order ☞ **P.54** ⊗ Combination with SKC・MC not available.	
	**MC**	Head tapping ❗ Available for EPJ—L when P≧8 ⊗ Combination with any other alteration not available. P M 8 M4 10 M5 12・15 M6 16～25 M8	

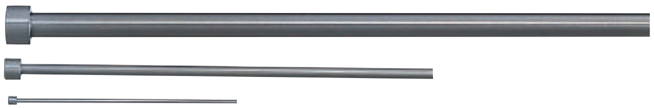
Dies Steel
SKD61 equivalent
＋
Nitriding

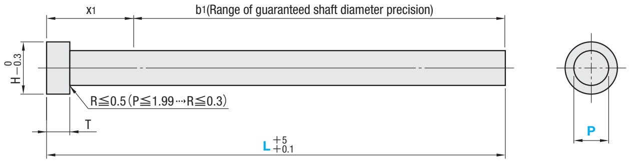
STRAIGHT EJECTOR PINS

—P DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE—



Non JIS material definition is listed on P.1351 - 1352





Range of guaranteed shaft diameter precision (Details P.1301)

Head thickness	L	x1 max.
T4	100～300	30
JIS	100～300	35
T4・JIS	350	210

Part Number	Head thickness	T T
EPNG	4mm(T4)	0 −0.02
EPJG	6・8mm(JIS)	0 −0.05

T P

P≦12.00	P>12.00
−0.01 −0.02	−0.01 −0.03

M SKD61 equivalent＋Nitrided
H Surface base:900HV～
Base materials:40～45HRC

Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

4mm head		JIS head		Part Number			L	P
				Type		No.	Selection	0.01mm increments
H	T	H	T	4mm head	JIS head			
3	4	—	—	**EPNG**	—	1.5	100 150 200	1.00～ 1.49
4						2	100 150 200 250 300 350	1.50～ 1.99
5						2.5		2.00～ 2.49
6						3	100 150 200 250 300 350	2.50～ 2.99
7						3.5		3.00～ 3.49
		8	6		**EPJG**	4	100 150 200 250 300 350	3.50～ 3.99
8						4.5		4.00～ 4.49
		9				5	100 150 200 250 300 350	4.50～ 4.99
9						5.5	100 150 200 250 300 350	5.00～ 5.49
		10				6	100 150 200 250 300 350	5.50～ 5.99
10		11				6.5		6.00～ 6.49
						7	100 150 200 250 300 350	6.50～ 6.99
11		13	8			8	100 150 200 250 300 350	7.00～ 7.99
15		15				10		8.00～ 9.99
17		17				12	100 150 200 250 300 350	10.00～11.99
20		20				15		12.00～14.99
21		21				16	100 150 200 250 300 350	15.00～15.99
—	—	25		—		20	150 200 250 300	16.00～19.99
		30				25	200 300	20.00～24.99

Since nitriding is performed after P dimension machining, the head may also be nitrided.
For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPNG.

Order

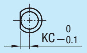
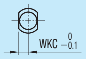
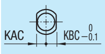
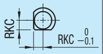
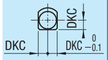
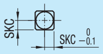
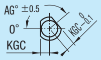
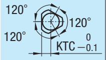
Part Number	—	L	—	P
EPJG 6	—	200	—	P5.61

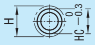
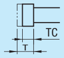
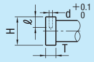
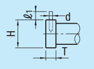
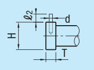
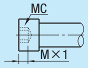
Days to Ship **Quotation**

Alterations

Part Number	—	L	—	P	—	(KC・WKC…etc.)
EPJG 4.5	—	200	—	P4.23	—	WKC2.115

Alteration details P.53

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	**Quotation**
	**WKC**	Two flats cutting P/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2		
	**DKC**	Three flats cutting P/2≦DKC<H/2		
	**SKC**	Four flats cutting P/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC<H, P≧1.5	**Quotation**
	**TC**	TC=0.1mm increments T/2≦TC<T, P≧1.5 Dimension L becomes shorter by (T−TC) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN not available. T d ℓ 4 2 3 6 3 5 8	
	**NCW**	Dowel hole boring＋Spring pin driving Available when H≧4 Combination with other than NHC・NHN not available. T d ℓ1 4 2 5 6 3 8	
	**NCS**	Dowel hole boring＋Dowel pin driving Available when H≧4 Combination with other than NHC・NHN not available. T d ℓ2 4 2 5 6 3 8	
	NHC	Numbering on the head How to order P.54 Combination with SKC・MC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 Combination with SKC・MC not available.	
	**MC**	Head tapping Available when P≧8.00 for EPJG Combination with any other alteration not available. P M P 8.00～ 9.99 M4 P10.00～11.99 M5 P12.00～15.99 M6 P16.00～24.99 M8	

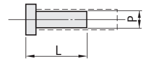
Price **Quotation**

Dies Steel
SKD61 equivalent
+
Nitriding

STRAIGHT EJECTOR PINS

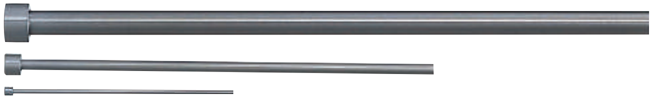
—L・P DIMENSION DESIGNATION TYPE—

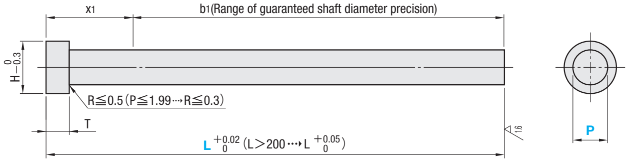
L・P dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS




X1
b1(Range of guaranteed shaft diameter precision)
H $^{0}_{-0.3}$
R≦0.5 (P≦1.99⋯R≦0.3)
T
L $^{+0.02}_{0}$ (L＞200⋯L $^{+0.05}_{0}$)
1.6
P

Range of guaranteed shaft diameter precision (Details P.1301)

Head thickness	L	x1 max.
T4	40.00～300.00	30
JIS	40.00～300.00	35
T4・JIS	300.01～350.00	210

Part Number	Head thickness	T T
EPNB	4mm(T4)	$^{0}_{-0.02}$
EPJB	6・8mm(JIS)	$^{0}_{-0.05}$

T P

P≦12.00	P＞12.00
$^{-0.01}_{-0.02}$	$^{-0.01}_{-0.03}$

M SKD61 equivalent+Nitrided
H Surface base:900HV～
Base materials:40～45HRC

Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

4mm head		JIS head		Part Number			0.01mm increments	
H	T	H	T	Type		No.	L	P
				4mm head	JIS head			
3	4	—	—	EPNB	—	1.5	40.00～200.00	1.00～ 1.49
4						2	40.00～250.00	1.50～ 1.99
5						2.5	40.00～400.00	2.00～ 2.49
6						3		2.50～ 2.99
7						3.5		3.00～ 3.49
		8	6		EPJB	4		3.50～ 3.99
8						4.5		4.00～ 4.49
		9				5	40.00～500.00	4.50～ 4.99
9						5.5		5.00～ 5.49
		10				6		5.50～ 5.99
10		11				6.5		6.00～ 6.49
						7		6.50～ 6.99
11		13	8			8		7.00～ 7.99
15		15				10		8.00～ 9.99
17		17				12		10.00～11.99
20		20				15		12.00～14.99
21		21				16		15.00～15.99
—	—	25		—		20		16.00～19.99
		30				25		20.00～24.99

Since nitriding is performed after P dimension machining, the head may also be nitrided.
For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPNB.

Order

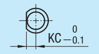
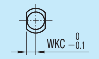
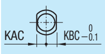
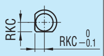
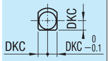
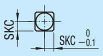
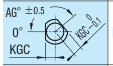
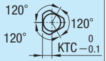
Part Number	—	L	—	P
EPJB 6	—	175.31	—	P5.61

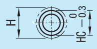
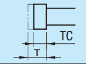
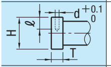
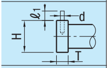
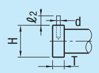
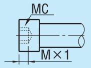
Days to Ship **Quotation**

Alterations

Part Number	—	L	—	P	—	(KC・WKC⋯etc.)
EPJB 4.5	—	248.35	—	P4.23	—	WKC2.115

Alteration details P.53

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting P/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2		Quotation
	DKC	Three flats cutting P/2≦DKC＜H/2		
	SKC	Four flats cutting P/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 AG=1° increments 0＜AG＜360		
	KTC	Three flats cutting at 120° P/2≦KTC＜H/2		

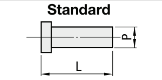
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC＜H, P≧1.5	
	TC	TC=0.1mm increments T/2≦TC＜T, P≧1.5 (Dimension L remains unchanged.) T−TC≦Lmax.−L	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN not available. T, d, ℓ 4, 2, 3 6, 3, 5 8	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN not available. T, d, ℓ1 4, 2, 5 6, 3 8	Quotation
	NCS	Dowel hole boring+Dowel pin driving Available when H≧4 Combination with other than NHC・NHN not available. T, d, ℓ2 4, 2, 5 6, 3 8	
	NHC	Numbering on the head How to order P.54 Combination with SKC・MC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 Combination with SKC・MC not available.	
	MC	Head tapping Available when P≧8.00 for EPJB Combination with any other alteration not available. P, M P 8.00～ 9.99, M4 P10.00～11.99, M5 P12.00～15.99, M6 P16.00～24.99, M8	

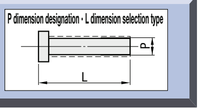
Price **Quotation**

Dies Steel
SKD61 equivalent
4mm Head

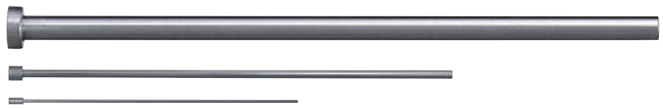
STRAIGHT EJECTOR PINS

—STANDARD／P DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE—

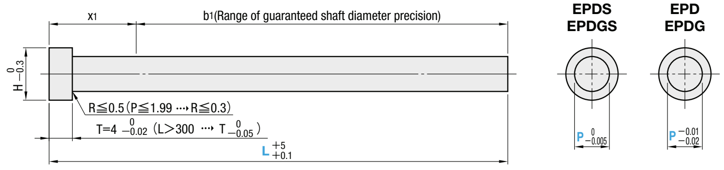




Non JIS material definition is listed on P.1351 - 1352



RoHS



Part Number		Head thickness	T P
EPDS	(Standard)	4mm(T4)	$^{0}_{-0.005}$
EPDGS	(P dimension designation・L dimension selection type)		
EPD	(Standard)		$^{-0.01}_{-0.02}$
EPDG	(P dimension designation・L dimension selection type)		

- Standard
  x1 max.=30

・P Dimension Designation・L Dimension Selection Type

L	x1 max.
100・150	30
200	60
250	110
300	160
400	260
500	360

Range of guaranteed shaft diameter precision (Details P.1301)

M SKD61 equivalent
H 50～55HRC
Range of guaranteed base material hardness (Details P.1303)

■Standard

H	T	Part Number Type	Part Number P	L Selection					
3	4	**EPDS** ($P^{0}_{-0.005}$) **EPD** ($P^{-0.01}_{-0.02}$)	1.5	100	150	200			
4			2	100	150	200	250		
5			2.5	100	150	200	250		
6			3	100	150	200		300	
7			3.5	100	150	200		300	
			4	100	150	200		300	
8			4.5	100		200		300	
			5	100	150	200		300	400	500
9			5.5	100		200		300	400	500
			6	100	150	200		300	400	500
10			6.5	100		200		300	400	500
			7	100	150	200		300	400	500
11			8	100	150	200		300	400	500
14			9	100		200		300	400	500
15			10	100	150	200		300	400	500
17			12	100		200		300	400	500
18			13			200		300	400	500

■P Dimension Designation・L Dimension Selection Type

H	T	Part Number Type	Part Number No.	L Selection	P 0.01mm increments
3	4	**EPDGS** ($P^{0}_{-0.005}$) **EPDG** ($P^{-0.01}_{-0.02}$)	1.5	100 150 200	1.00～ 1.49
4			2	100 150 200 250	1.50～ 1.99
5			2.5		2.00～ 2.49
6			3	100 150 200 300	2.50～ 2.99
7			3.5		3.00～ 3.49
			4		3.50～ 3.99
8			4.5	100 200 300	4.00～ 4.49
			5	100 150 200 300	4.50～ 4.99
9			5.5	100 200 300	5.00～ 5.49
			6	100 150 200 300 400 500	5.50～ 5.99
10			6.5	100 200 300 400 500	6.00～ 6.49
			7	100 150 200 300 400 500	6.50～ 6.99
11			8	100 150 200 300 400 500	7.00～ 7.99
15			10		8.00～ 9.99
17			12	100 200 300 400 500	10.00～11.99
18			13	200 300 400 500	12.00～12.99

When L≧200, Please place your order after confirmation of the range of guaranteed shaft diameter precision. (Details P.1301)

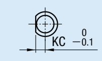
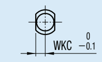
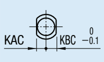
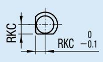
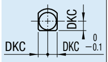
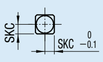
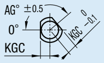
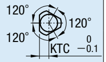
Part Number	—	L	—	P
EPDG 12	—	300	—	P11.00

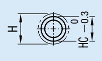
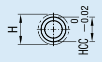
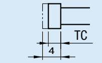
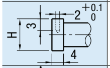
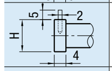
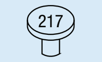
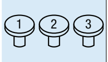
Quotation

Alterations

Part Number	—	L	—	P	—	(KC・WKC⋯etc.)
EPDG 12	—	300	—	P11.00	—	HC15

Alteration details P.53

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation EPDS・EPD 0.05mm increments possible EPDGS・EPDG 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting P/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2		
	**DKC**	Three flats cutting P/2≦DKC<H/2		
	**SKC**	Four flats cutting P/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2		

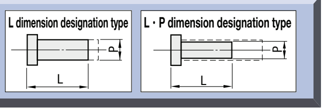
Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC<H EPDGS・EPDG⋯→P≧1.5	Quotation
	**HCC**	HCC=0.1mm increments P+1≦HCC<H−0.3 EPDGS・EPDG⋯→P≧1.5	
	**TC**	TC=0.1mm increments 2.0≦TC<4 Dimension L becomes shorter by (4−TC) EPDGS,EPDG⋯→P≧1.5,4−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
	**NCW**	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
	**NHC**	Numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC not available.	

P Price Quotation

Dies Steel
SKD61 equivalent
4mm Head

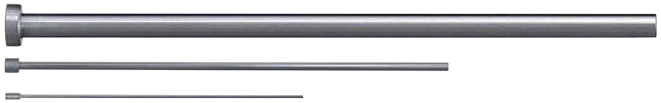
STRAIGHT EJECTOR PINS

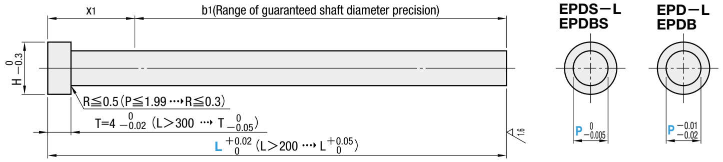
—L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION TYPE—


L dimension designation type
L
L・P dimension designation type
L
P

Non JIS material definition is listed on P.1351 - 1352

RoHS




x1
b1(Range of guaranteed shaft diameter precision)
H 0 −0.3
R≦0.5(P≦1.99 ···›R≦0.3)
T=4 0 −0.02 (L>300 ··· T 0 −0.05)
L +0.02 0 (L>200 ··· L +0.05 0)
1.6
EPDS−L
EPDBS
EPD−L
EPDB
P 0 −0.005
P −0.01 −0.02

Part Number		Head thickness	T P
EPDS−L	(L dimension designation type)	4mm(T4)	0 −0.005
EPDBS	(L・P dimension designation type)		
EPD−L	(L dimension designation type)		−0.01 −0.02
EPDB	(L・P dimension designation type)		

・L Dimension Designation Type・L・P Dimension Designation Type
T4 ··· x1 max.30

L	x1 max.
40.00 ～ 150.00	30
150.01 ～ 200.00	60
200.01 ～ 250.00	110
250.01 ～ 300.00	160
300.01 ～ 350.00	210
350.01 ～ 400.00	260
400.01 ～ 450.00	310
450.01 ～ 500.00	360

Range of guaranteed shaft diameter precision (Details P.1301)

M SKD61 equivalent
H 50～55HRC
Range of guaranteed base material hardness (Details P.1303)

■L Dimension Designation Type

H	T	Part Number		L
		Type	P	0.01mm increments
3	4	EPDS−L ($P^{0}_{-0.005}$) EPD−L ($P^{-0.01}_{-0.02}$)	1.5	40.00～200.00
4			2	40.00～250.00
5			2.5	
6			3	40.00～300.00
7			3.5	
			4	
8			4.5	
			5	40.00～500.00
9			5.5	
			6	
10			6.5	
			7	
11			8	
14			9	
15			10	
17			12	
18			13	

■L・P Dimension Designation Type

H	T	Part Number		0.01mm increments	
		Type	No.	L	P
3	4	EPDBS ($P^{0}_{-0.005}$) EPDB ($P^{-0.01}_{-0.02}$)	1.5	40.00～200.00	1.00～ 1.49
4			2	40.00～250.00	1.50～ 1.99
5			2.5		2.00～ 2.49
6			3	40.00～300.00	2.50～ 2.99
7			3.5		3.00～ 3.49
			4		3.50～ 3.99
8			4.5		4.00～ 4.49
			5		4.50～ 4.99
9			5.5		5.00～ 5.49
			6	40.00～500.00	5.50～ 5.99
10			6.5		6.00～ 6.49
			7		6.50～ 6.99
11			8		7.00～ 7.99
15			10		8.00～ 9.99
17			12		10.00～11.99
18			13		12.00～12.99

When L≧150.01, Please place your order after confirmation of the range of guaranteed shaft diameter precision. (Details P.1301)

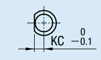
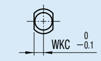
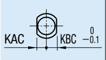
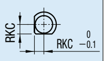
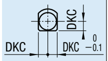
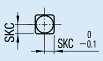
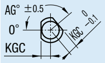
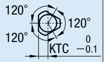
Part Number	—	L	—	P
EPDS−L2.5	—	80.00		
EPDB 12	—	350.00	—	P11.00

Quotation

Alterations

Part Number	—	L	—	P	—	(KC・WKC···etc.)
EPDB 12	—	350.00	—	P11.00	—	HC15

Alteration details P.53

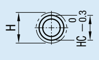
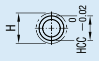
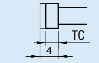
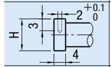
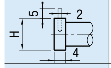
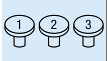
Alterations	Code	Spec.	1Code
	**KC**	Single flat cutting P/2≦KC<H/2	Quotation
	**WKC**	Two flats cutting P/2≦WKC<H/2	
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	**RKC**	Two flats (right angled) cutting P/2≦RKC<H/2	
 DKC DKC DKC 0 −0.1	**DKC**	Three flats cutting P/2≦DKC<H/2	
	**SKC**	Four flats cutting P/2≦SKC<H/2	
 AG° ±0.5 0° KGC KGC 0 −0.1	**KGC**	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360	
 120° 120° 120° KTC 0 −0.1	**KTC**	Three flats cutting at 120° P/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation
EPDS−L・EPD−L
0.05mm increments possible

EPDBS・EPDB
0.005mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

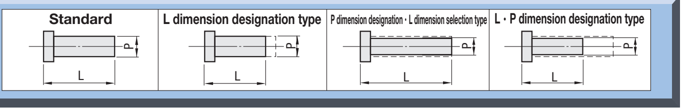
Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC<H EPDBS・EPDB ···› P≧1.5	Quotation
	**HCC**	HCC=0.1mm increments P+1≦HCC<H−0.3 EPDBS・EPDB ···› P≧1.5	
	**TC**	TC=0.1mm increments 2.0≦TC<4 (Dimensions L remains unchanged.) EPDBS・EPDB ···› P≧1.5 4−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN not available.	
	**NCW**	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN not available.	
	NHC	Numbering on the head How to order P.54 Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order P.54 Combination with SKC not available.	

P Price Quotation

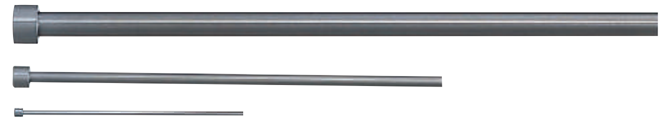
Prehardened
Dies Steel
SKD61 equivalent
JIS head

STRAIGHT EJECTOR PINS

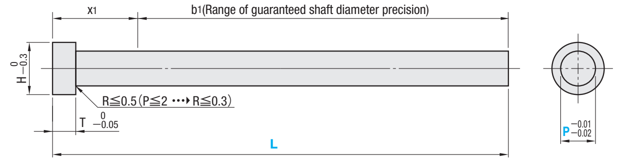
—STANDARD／L DIMENSION DESIGNATION TYPE／P DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE／L・P DIMENSION DESIGNATION TYPE—


Standard
L dimension designation type
P dimension designation・L dimension selection type
L・P dimension designation type
P
L

Non JIS material definition is listed on P.1351 - 1352



RoHS



Part Number		Head thickness	T L	Tip Face Roughness
EPAJ	(Standard)	4・6・8mm (JIS)	+5 +0.1	—
EPAJG	(P dimension designation・L dimension selection type)			
EPAJ—L	(L dimension designation type)		$^{+0.05*}_{0}$	
EPAJB	(L・P dimension designation type)			

*EPAJ-L L＞500 ···› L$^{+0.5}_{0}$

Range of guaranteed shaft diameter precision (Details P.1301)
x1 max.＝35

M SKD61 equivalent (Prehardened)
H 40～45HRC
Range of guaranteed base material hardness (Details P.1303)

■ Standard

H	T	Part Number		L
		Type	P	Selection
4	4	EPAJ	2	100 200
5			2.5	
6			3	100 200 300
7			3.5	
8	6		4	
			4.5	
9			5	
10			6	100 200 300 500 800 1000
11			7	
13	8		8	
15			10	
17			12	200 300 500 800 1000

■ P Dimension Designation・L Dimension Selection Type

H	T	Part Number		L	P
		Type	No.	Selection	0.01mm increments
4	4	EPAJG	2	100 200	1.50～ 1.99
5			2.5		2.00～ 2.49
6			3	100 200 300	2.50～ 2.99
7			3.5		3.00～ 3.49
8	6		4		3.50～ 3.99
			4.5		4.00～ 4.49
9			5		4.50～ 4.99
10			6	100 200 300	5.00～ 5.99
11			7		6.00～ 6.99
13	8		8		7.00～ 7.99
15			10		8.00～ 9.99
17			12	200 300	10.00～11.99

■ L Dimension Designation Type

H	T	Part Number		L
		Type	P	0.01mm increments
4	4	EPAJ—L	2	40.00～ 200.00
5			2.5	
6			3	40.00～ 300.00
7			3.5	
8	6		4	
			4.5	
9			5	
10			6	40.00～1000.00
11			7	
13	8		8	
15			10	
17			12	

■ L・P Dimension Designation Type

H	T	Part Number		0.01mm increments	
		Type	No.	L	P
4	4	EPAJB	2	40.00～200.00	1.50～ 1.99
5			2.5		2.00～ 2.49
6			3	40.00～300.00	2.50～ 2.99
7			3.5		3.00～ 3.49
8	6		4		3.50～ 3.99
			4.5		4.00～ 4.49
9			5		4.50～ 4.99
10			6		5.00～ 5.99
11			7		6.00～ 6.99
13	8		8		7.00～ 7.99
15			10		8.00～ 9.99
17			12		10.00～11.99

Order

Part Number	L	P
(Standard) EPAJ	3 — 100	
(L dimension designation type) EPAJ—L	3 — 150.35	
(P dimension designation・L dimension selection type) EPAJG	4 — 100	— P3.99
(L・P dimension designation type) EPAJB	4 — 180.05	— P3.99

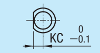
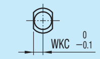
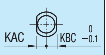
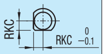
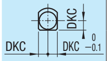
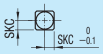
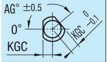
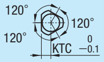
Days to Ship Quotation

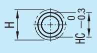
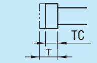
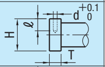
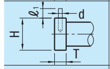
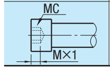
Alterations

Part Number — L — P — (KC・WKC···etc.)
EPAJB 5 — 125.61 — P4.97 — RKC2.485

Quotation

Alteration details P.53

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation EPAJ・EPAJ-L 0.05mm increments possible EPAJG・EPAJB 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC＝0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2		
	DKC	Three flats cutting P/2≦DKC＜H/2		
	SKC	Four flats cutting P/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 AG＝1° increments 0＜AG＜360		
	KTC	Three flats cutting at 120° P/2≦KTC＜H/2		

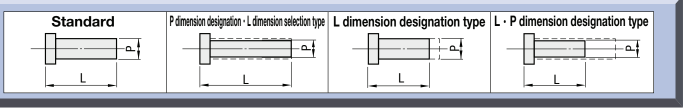
Alterations	Code	Spec.	1Code
	HC	HC＝0.1mm increments P＋1≦HC＜H	Quotation
	TC	TC＝0.1mm increments T/2≦TC＜T EPAJ,EPAJG ···› Dimension L becomes shorter by (T—TC) EPAJ—L,EPAJB ···› T—TC≦Lmax.—L (Dimension L remains unchanged.)	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T | d | ℓ: 4 | 2 | 3; 6, 8 | 3 | 5	
	NCW	Dowel hole boring＋Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T | d | ℓ1: 4 | 2 | 5; 6, 8 | 3 | 5	
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC・MC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC・MC not available.	
	MC	Head tapping Available when P≧8.00 ⊗ Combination with any other alteration not available. P | M: P 8.00～ 9.99 | M4; P10.00～11.99 | M5; P12 | M6	

Price Quotation

Stainless
SUS440C

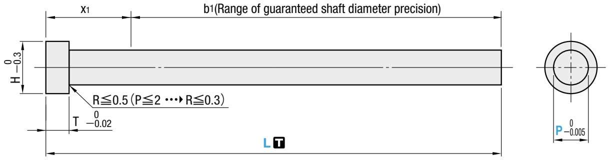
STRAIGHT EJECTOR PINS

—STANDARD／P DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE／L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION TYPE—


Standard
P dimension designation・L dimension selection type
L dimension designation type
L・P dimension designation type
L
P

Non JIS material definition is listed on P.1351 - 1352

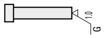
RoHS



Range of guaranteed shaft diameter precision (Details P.1301)
T4 ···▸ x1 max.30
JIS ···▸ x1 max.35

M SUS440C
H 56～60HRC
Range of guaranteed base material hardness
(Details P.1303)

Part Number	Type	T L	Head thickness
EPW	Standard	$^{+5}_{+0.1}$	4mm(T4)
EPWJ			6mm(JIS)
EPWG	P dimension designation・L dimension selection type		4mm(T4)
EPWJG			6mm(JIS)

Part Number	Type	T L	Head thickness	Tip Face Roughness
EPW−L	L dimension designation type	$^{+0.02}_{0}$	4mm(T4)	
EPWJ−L			6mm(JIS)	
EPWB	L・P dimension designation type		4mm(T4)	
EPWJB			6mm(JIS)	

■Standard

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	P	L Selection
3	4	—	—	EPW	—	1	100 150
						1.5	100 150 200
4						2	
5						2.5	
6						3	
7						3.5	
		8	6		EPWJ	4	
8						4.5	
		9				5	
9						5.5	
		10				6	

For JIS head type less than P4 is T=4, please place the order for 4mm head type of EPW

■P Dimension Designation・L Dimension Selection Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	No.	L Selection	P 0.01mm increments
3	4	—	—	EPWG	—	1.5	100 150 200	1.00～1.49
4						2		1.50～1.99
5						2.5		2.00～2.49
6						3		2.50～2.99
7						3.5		3.00～3.49
		8	6		EPWJG	4		3.50～3.99
8						4.5		4.00～4.49
		9				5		4.50～4.99
9						5.5		5.00～5.49
		10				6		5.50～5.99

For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPWG

■L Dimension Designation Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	P	L 0.01mm increments
3	4	—	—	EPW−L	—	1	40.00～150.00
						1.5	40.00～200.00
4						2	
5						2.5	
6						3	
7						3.5	
		8	6		EPWJ−L	4	
8						4.5	
		9				5	
9						5.5	
		10				6	

For JIS head type less than P4 is T=4, please place the order for 4mm head type of EPW−L

■L・P Dimension Designation Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	No.	0.01mm increments L	0.01mm increments P
3	4	—	—	EPWB	—	1.5	40.00～200.00	1.00～1.49
4						2		1.50～1.99
5						2.5		2.00～2.49
6						3		2.50～2.99
7						3.5		3.00～3.49
		8	6		EPWJB	4		3.50～3.99
8						4.5		4.00～4.49
		9				5		4.50～4.99
9						5.5		5.00～5.49
		10				6		5.50～5.99

For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPWB

Order

	Part Number	—	L	—	P
(Standard)	EPW 6	—	100		
(L・P dimension designation type)	EPWG 5	—	100	—	P4.95
(L dimension designation type)	EPWJ−L4	—	99.65		
(L・P dimension designation type)	EPWJB 5	—	95.05	—	P4.95

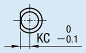
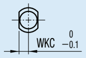
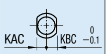
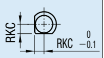
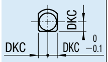
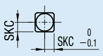
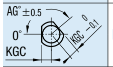
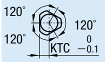
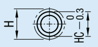
Days to Ship Quotation

Alterations

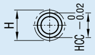
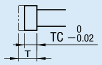
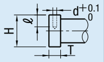
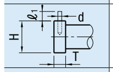
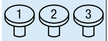
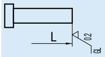
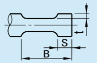
Part Number — L — P — (KC・WKC···etc.)
EPWJB 6 — 135.51 — P5.59 — WKC2.795

Quotation

Alteration details P.53

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	

About Designation Unit for Key Flat Cutting
(1)To align the key flat with the shaft diameter
Unit of designation
EPW・EPWJ
EPW-L・EPWJ-L
0.05mm increments possible
EPWG・EPWJG
EPWB・EPWJB
0.005mm increments possible
(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	Quotation
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 T−TC≦Lmax.−L EPW,EPWJ,EPWG,EPWJG ···▸ Dimension L becomes shorter by (T−TC) EPW-L,EPWJ-L,EPWB,EPWJB ···▸ Dimension L remains unchanged.	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T d ℓ 4 2 3 6 3 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T d ℓ1 4 2 5 6 3 5	
	NHC	Numbering on the head How to order P.54 Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 Combination with SKC not available.	
	TMC	Lapping on the tip face Available for EPW-L,EPWJ-L・EPWB,EPWJB	
	GVC	S,B=1mm increments 2≦S≦10,S+5≦B≦30 Available when P≧3 Available for EPW-L,EPWJ-L・EPWB,EPWJB	

Price Quotation

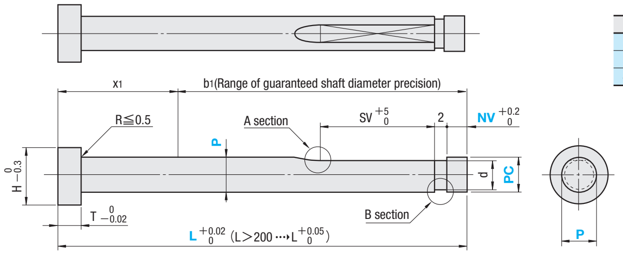
High Speed
Steel
SKH51 equivalent

STRAIGHT EJECTOR PINS WITH GAS VENT

—L・PC DIMENSION DESIGNATION TYPE／L・P・PC DIMENSION DESIGNATION TYPE—

ⓘ Non JIS material definition is listed on P.1351 - 1352

RoHS


x1
b1(Range of guaranteed shaft diameter precision)
R≦0.5
A section
SV +5 0
2
NV +0.2 0
P
H 0 −0.3
T 0 −0.02
d
PC
B section
L +0.02 0 (L>200 ⋯ L +0.05 0)
P

P	d
2 ～ 2.49	P−0.2
2.50～ 3.99	P−0.4
4.00～12	P−0.6

L	SV
40.00～ 60.00	15
60.01～200.00	30
200.01～350.00	50

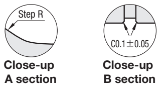
ⓘ Range of guaranteed shaft diameter precision (Details P.1301)

- L・PC Dimension Designation Type
  T4 ⋯ x1 max.30
  JIS ⋯ x1 max.35
- L・P・PC Dimension Designation Type

Head thickness	L	x1 max.
T4	40.00 ～ 200.00	30
JIS	40.00 ～ 200.00	35
T4・JIS	200.01 ～ 250.00	110
	250.01 ～ 300.00	160
	300.01 ～ 350.00	210

(The guarantee range of shaft diameter precision is the value of shaft diameter except gas vent.)

Part Number	Head thickness	T P	T PC
GVB−EPH−L GVB−EPHB	4mm(T4)	$^{0}_{-0.005}$	$^{0}_{-0.005}$
GVB−EPHE−L GVB−EPHBE		$^{-0.01}_{-0.02}$	
GVB−EPHJ−L GVB−EPHJB	6・8mm(JIS)	$^{0}_{-0.005}$	
GVB−EPHJE−L GVB−EPHJBE		$^{-0.01}_{-0.02}$	



Close-up A section
Close-up B section

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details P.1303)

■ L・PC Dimension Designation Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	P	0.01mm increments L	0.01mm increments PC	0.5mm increments NV
4	4	—	—	GVB−EPH−L GVB−EPHE−L	—	2	40.00～300.00	(GVB − EPH − L GVB − EPHJ − L) P−0.08≦85<P (GVB − EPHE − L GVB − EPHJE − L) P−0.08≦85<P−0.02	0.5～8.0
5						2.5			
6						3			
7						3.5			2.0～10.0
		8	6		GVB−EPHJ−L GVB−EPHJE−L	4			
8						4.5	40.00～300.00(350.00)		
		9				5	40.00～350.00		
9						5.5			
		10				6			
10		11				6.5			
						7			
11		13	8			8			
15		15				10			
17		17				12			

ⓘ When P=PC; refer to P.87 ⓘ L in ( ) is applicable only for head thickness 4mm type.

■ L・P・PC Dimension Designation Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	No.	0.01mm increments L	0.01mm increments P	0.01mm increments PC	0.5mm increments NV
5	4	—	—	GVB−EPHB GVB−EPHBE	—	2.5	40.00～300.00	2.00～ 2.49	(GVB − EPHB GVB − EPHJB) P−0.08≦85<P (GVB − EPHBE GVB − EPHJBE) P−0.08≦85<P−0.02	0.5～ 8.0
6						3		2.50～ 2.99		
7						3.5		3.00～ 3.49		2.0～10.0
		8	6		GVB−EPHJB GVB−EPHJBE	4		3.50～ 3.99		
8						4.5	40.00～300.00(350.00)	4.00～ 4.49		
		9				5	40.00～350.00	4.50～ 4.99		
9						5.5		5.00～ 5.49		
		10				6		5.50～ 5.99		
10		11				6.5		6.00～ 6.49		
						7		6.50～ 6.99		
11		13	8			8		7.00～ 7.99		
15		15				10		8.00～ 9.99		
17		17				12		10.00～11.99		

ⓘ When P=PC; refer to P.87 ⓘ L in ( ) is applicable only for head thickness 4mm type.

Order

Part Number	L	P	PC	NV
GVB−EPH−L5	210.00		PC4.96	NV2.0
GVB−EPHB3	148.36	P2.96	PC2.94	NV2.0

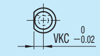
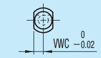
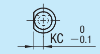
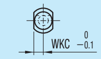
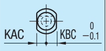
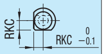
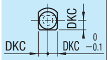
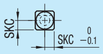
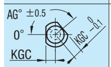
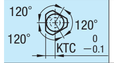
Days to Ship Quotation

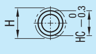
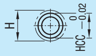
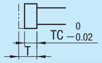
Alterations

Part Number	L	P	PC	NV	(VKC・VWC⋯etc.)
GVB−EPHB3	148.36	P2.96	PC2.94	NV2.0	KC1.48

Quotation

Alteration details P.53

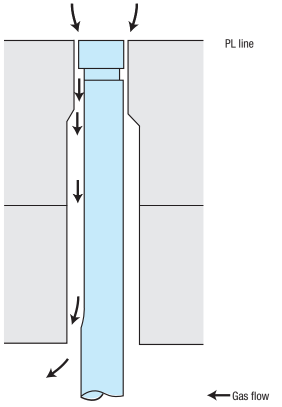
Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation GVB−EPH−L・GVB−EPHE−L GVB−EPHJ−L・GVB−EPHJE−L 0.05mm increments possible GVB−EPHB・GVB−EPHBE GVB−EPHJB・GVB−EPHJBE 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm ⓘ Flat cutting position is set at 90° of SV dimension in counter clockwise direction.	
	VWC	Precision two flats cutting P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments ⓘ P+1≦HC<H	
	HCC	HCC=0.1mm increments ⓘ P+1≦HCC<H−0.3	Quotation
	TC	TC=0.1mm increments ⓘ T/2≦TC<T (Dimension L remains unchanged.) ⓘ T−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC not available.	

Example

■ Characteristics

Let gas out from the inside of the cavity via the clearance around the ejector pin.



Price Quotation

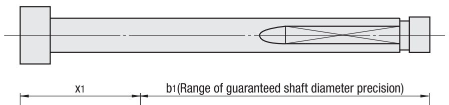
High Speed Steel
SKH51 equivalent

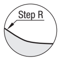
STRAIGHT EJECTOR PINS WITH GAS VENT

—L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION TYPE—

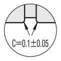
Refer to P.85 when tip diameter dimension designated.

RoHS



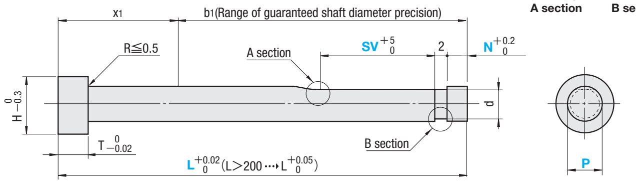


Close-up
A section



Close-up
B section

P	d
2　～ 2.49	P−0.2
2.50～ 3.99	P−0.4
4.00～12	P−0.6

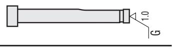

x1
b1(Range of guaranteed shaft diameter precision)
R≦0.5
A section
SV +5 0
2
N +0.2 0
H 0 −0.3
d
T 0 −0.02
B section
L +0.02 0 (L>200 ···› L +0.05 0)
P

Range of guaranteed shaft diameter precision (Details P.1301)

- L Dimension Designation Type
  T4 ···› x1 max.30
  JIS ···› x1 max.35
- L・P Dimension Designation Type

Head thickness	L	x1 max.
T4	40.00～200.00	30
JIS	40.00～200.00	35
T4・JIS	200.01～250.00	110
	250.01～300.00	160
	300.01～350.00	210

(The guarantee range of shaft diameter precision is the value of shaft diameter except gas vent.)

Part Number	Head thickness	Part Number	Head thickness	Type	T P	Tip Face Roughness
GV−EPH−L	4mm (T4)	GV−EPHJ−L	6・8mm (JIS)	L dimension designation type	$^{\ \ 0}_{-0.005}$	—
GV−EPHE−L		GV−EPHJE−L			$^{-0.01}_{-0.02}$	
GV−EPHB		GV−EPHJB		L・P dimension designation type	$^{\ \ 0}_{-0.005}$	
GV−EPHBE		GV−EPHJBE			$^{-0.01}_{-0.02}$	

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details P.1303)

■L Dimension Designation Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	P	0.01mm increments L	0.5mm increments N	0.5mm increments SV
4	4	—	—	GV−EPH−L GV−EPHE−L	—	2	40.00～300.00	0.5～8.0 L−(2+SV+N)≧10	2.0～30.0 L−(2+SV+N)≧10
5						2.5			
6						3			
7						3.5		2.0～10.0 L−(2+SV+N)≧10	2.0～50.0 L−(2+SV+N)≧10
		8	6		GV−EPHJ−L GV−EPHJE−L	4			
8						4.5	40.00～300.00(350.00)		
		9				5	40.00～350.00		
9						5.5			
		10				6			
10		11				6.5			
						7			
11		13	8			8			
15		15				10			
17		17				12			

L in ( ) is applicable only for head thickness 4mm type.

■L・P Dimension Designation Type

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	No.	0.01mm increments L	0.01mm increments P	0.5mm increments N	0.5mm increments SV
5	4	—	—	GV−EPHB GV−EPHBE	—	2.5	40.00～300.00	2.00～ 2.49	0.5～8.0 L−(2+SV+N)≧10	2.0～30.0 L−(2+SV+N)≧10
6						3		2.50～ 2.99		
7						3.5		3.00～ 3.49	2.0～10.0 L−(2+SV+N)≧10	2.0～50.0 L−(2+SV+N)≧10
		8	6		GV−EPHJB GV−EPHJBE	4		3.50～ 3.99		
8						4.5	40.00～300.00(350.00)	4.00～ 4.49		
		9				5	40.00～350.00	4.50～ 4.99		
9						5.5		5.00～ 5.49		
		10				6		5.50～ 5.99		
10		11				6.5		6.00～ 6.49		
						7		6.50～ 6.99		
11		13	8			8		7.00～ 7.99		
15		15				10		8.00～ 9.99		
17		17				12		10.00～11.99		

L in ( ) is applicable only for head thickness 4mm type.

Order

Part Number	—	L	—	P	—	N	—	SV
GV−EPH−L5	—	210.00			—	N2.0	—	SV4.0
GV−EPHB3	—	148.36	—	P2.96	—	N2.0	—	SV4.0

Days to Ship Quotation

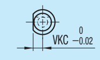
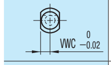
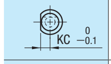
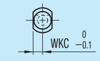
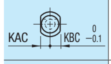
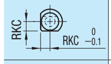
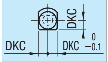
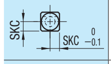
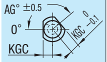
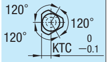
Non JIS material definition is listed on P.1351 - 1352

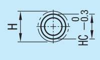
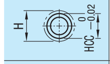
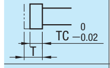
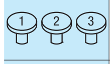
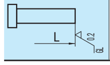
Alterations

Part Number	—	L	—	P	—	N	—	SV	—	(KC・WKC···etc.)
GV−EPHB3	—	148.36	—	P2.96	—	N2.0	—	SV4.0	—	KC1.48

Quotation

Alteration details P.53

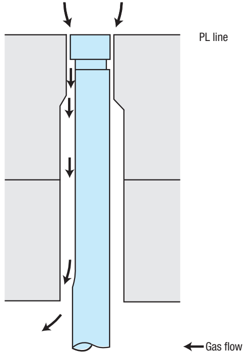
Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting P/2≦VKC< H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation GV−EPH−L・GV−EPHE−L GV−EPHJ−L・GV−EPHJE−L 0.05mm increments possible GV−EPHB・GV−EPHBE GV−EPHJB・GV−EPHJBE 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	VWC	Precision two flats cutting P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H	
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3	
	TC	TC=0.1mm increments T/2≦TC<T (Dimension L remains unchanged.) T−TC≦Lmax.−L	Quotation
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	TMC	Lapping on the tip face. Details P.54	

Example

■Characteristics

Let gas out from the inside of the cavity via the clearance around the ejector pin.

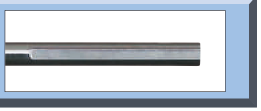


Price Quotation

High Speed Steel
SKH51 equivalent

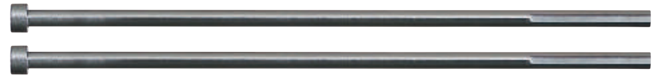
STRAIGHT EJECTOR PINS WITH GAS VENT

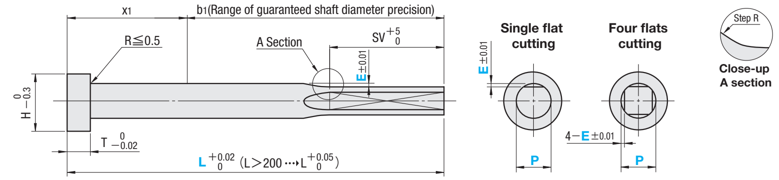
—L DIMENSION DESIGNATION／L・P DIMENSION DESIGNATION WITH CUTTING FACETS TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS





Limit of E±0.01 is within 10mm from the tip.

Part Number		Head thickness	T P
Single flat cutting	Four flats cutting		
GW−EPH−L GW−EPHB	GWS−EPH−L GWS−EPHB	4mm(T4)	0 −0.005
GW−EPHE−L GW−EPHBE	GWS−EPHE−L GWS−EPHBE		−0.01 −0.02
GW−EPHJ−L GW−EPHJB	GWS−EPHJ−L GWS−EPHJB	6・8mm(JIS)	0 −0.005
GW−EPHJE−L GW−EPHJBE	GWS−EPHJE−L GWS−EPHJBE		−0.01 −0.02

Range of guaranteed shaft diameter precision (Details P.1301)
- L Dimension Designation Type T4 ···› x_1 max.30
- L・P Dimension Designation Type JIS ···› x_1 max.35

Head thickness	L	x_1 max.
T4	40.00～200.00	30
JIS	40.00～200.00	35
T4・JIS	200.01～250.00	110
	250.01～300.00	160
	300.01～350.00	210

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details P.1303)
(The guarantee range of shaft diameter precision is the value of shaft diameter except gas vent.)

■L Dimension Designation Type

4mm head		JIS head		Part Number			0.01mm increments		SV
H	T	H	T	Type 4mm head	Type JIS head	P	L	E	
3	4	—	—	Single flat cutting GW−EPH−L GW−EPHE−L	—	0.6	40.00～150.00	Single flat cutting 0.02～0.05 Four flats cutting 0.03～0.05	L / SV 40.00～ 60.00 / 15 60.01～200.00 / 30 200.01～350.00 / 50
						0.7			
						0.8			
						0.9			
						1	40.00～200.00		
						1.2			
				Single flat cutting GW−EPH−L GW−EPHE−L Four flats cutting GWS−EPH−L GWS−EPHE−L		1.5	(40.00)60.00～250.00		
4						2	(40.00)60.00～300.00		
5						2.5			
6						3	(40.00)60.00～350.00		
7						3.5			
		8	6		Single flat cutting GW−EPHJ−L GW−EPHJE−L Four flats cutting GWS−EPHJ−L GWS−EPHJE−L	4			
8						4.5			
		9				5			
9						5.5			
		10				6			
10		11				6.5			
						7			
11		13	8			8			
15		15				10			
17		17				12			

Dimension L figures in parenthesis represents for single flat cutting. L dimension is up to 300 for head thickness JIS of P4.5.

■L・P Dimension Designation Type

4mm head		JIS head		Part Number			0.01mm increments			SV
H	T	H	T	Type 4mm head	Type JIS head	No.	L	P	E	
3	4	—	—	Single flat cutting GW−EPHB GW−EPHBE	—	0.7	40.00～100.00	0.60～ 0.69	Single flat cutting 0.02～0.05 Four flats cutting 0.03～0.05	L / SV 40.00～ 60.00 / 15 60.01～200.00 / 30 200.01～350.00 / 50
						0.8	40.00～150.00	0.70～ 0.79		
						0.9		0.80～ 0.89		
						1	40.00～200.00	0.90～ 0.99		
						1.5	(40.00)60.00～250.00	1.20～ 1.49		
4				Single flat cutting GW−EPHB GW−EPHBE Four flats cutting GWS−EPHB GWS−EPHBE		2	(40.00)60.00～300.00	1.50～ 1.99		
5						2.5		2.00～ 2.49		
6						3		2.50～ 2.99		
7						3.5		3.00～ 3.49		
		8	6		Single flat cutting GW−EPHJB GW−EPHJBE Four flats cutting GWS−EPHJB GWS−EPHJBE	4		3.50～ 3.99		
8						4.5	(40.00)60.00～350.00	4.00～ 4.49		
		9				5		4.50～ 4.99		
9						5.5		5.00～ 5.49		
		10				6		5.50～ 5.99		
10		11				6.5		6.00～ 6.49		
						7		6.50～ 6.99		
11		13	8			8		7.00～ 7.99		
15		15				10		8.00～ 9.99		
17		17				12		10.00～11.99		

Dimension L figures in parenthesis represents for single flat cutting. L dimension is up to 300 for head thickness JIS of No.4.5.

Order

Part Number	—	L	—	P	—	E
GW−EPH−L5	—	210.00			—	E0.03
GWS−EPHB6	—	230.00	—	P5.50	—	E0.03

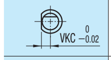
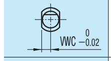
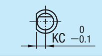
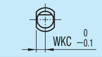
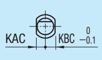
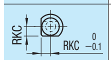
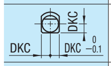
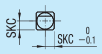
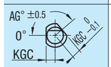
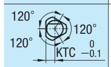
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	E	—	(KC・WKC···etc.)
GW−EPHB3	—	148.36	—	P2.96	—	E0.03	—	KC1.48

Quotation

Alteration details P.53

Alterations	Code	Spec.	1Code
	VKC	Precision single flat cutting P/2≦VKC<H/2	
	VWC	Precision two flats cutting P/2≦VWC<H/2	
	KC	Single flat cutting P/2≦KC<H/2	
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	Quotation
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting

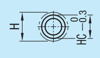
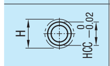
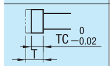
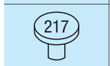
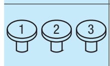
(1)To align the key flat with the shaft diameter

Unit of designation
L Dimension Designation Type 0.05mm increments possible
L・P Dimension Designation Type 0.005mm increments possible

(2)To designate arbitrary key flat dimensions

Unit of designation 0.1mm

Flat cutting position is set at 90° of cutting facet in counterclockwise direction.

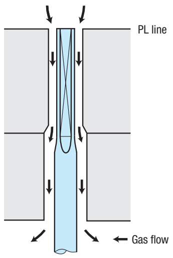
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	Quotation
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 (Dimension L remains unchanged) T−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC not available.	

Price Quotation

Example

■Characteristics

Let gas out from the inside of the cavity via the clearance around the ejector pin.

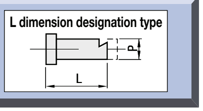


High Speed Steel
SKH51 equivalent
4mm head

EJECTOR PINS WITH Z GROOVE PROCESSED

—L DIMENSION DESIGNATION TYPE—

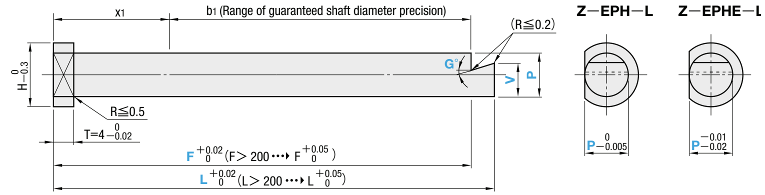
L dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS

Select a tip shape



X1
b1 (Range of guaranteed shaft diameter precision)
(R≦0.2)
G°
V
P
H $^{0}_{-0.3}$
R≦0.5
T=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F> 200 ···› F $^{+0.05}_{0}$)
L $^{+0.02}_{0}$ (L> 200 ···› L $^{+0.05}_{0}$)
Z−EPH−L
Z−EPHE−L
P $^{0}_{-0.005}$
P $^{-0.01}_{-0.02}$

V−(L−F)tanG≧1

Range of guaranteed shaft diameter precision (Details ☞ **P.1301**)
T4 ···› x1 max.30

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details ☞ **P.1303**)

To determine the shape position, key flat cutting is made at the standard 0°

Part Number	Head thickness	T P	T G	T V
Z−EPH−L	4mm(T4)	$^{0}_{-0.005}$	±30'	±0.05
Z−EPHE−L		$^{-0.01}_{-0.02}$		

H	T	Part Number Type	P	0.01mm increments L	0.5mm increments V	1° increments G°	0.01mm increments F
4	4	Z−EPH−L Z−EPHE−L	2	50.00～300.00	1.5≦V<P	0～45	L−F≦10
5			2.5				
6			3				
7			4	50.00～350.00			
8			5				
9			6				
10			7				
11			8				

V−(L−F)tanG≧1

Order

Part Number		L	V	G	F
Type	P				
Z−EPH−L	5	150.00	V2.0	G5	F145.00

Days to Ship Quotation

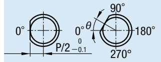
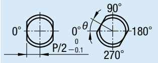
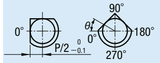
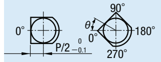
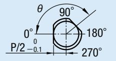
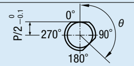
Price Quotation

Alterations

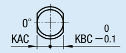
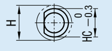
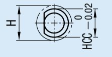
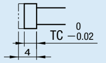
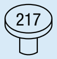
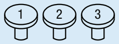
Part Number	L	V	G	F	(AKC · AWC···etc.)
Z−EPH−L5	150.00	V2.0	G5	F145.00	TC2

Quotation

Alteration details ☞ P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	Quotation
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	

0°
90°
θ
180°
270°
P/2 $^{0}_{-0.1}$

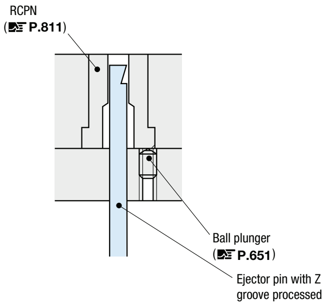
Alterations	Code	Spec.	1Code
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	
	HC	HC=0.1mm increments P+1≦HC<H	
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3	Quotation
	TC	TC=0.1mm increments 2≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	NHC	Numbering on the head How to order ☞ P.54	
	NHN	Automatic sequential numbering on the head How to order ☞ P.54	

0°
KAC
KBC $^{0}_{-0.1}$
H
HC $^{0}_{-0.3}$
HCC $^{0}_{-0.02}$
TC $^{0}_{-0.02}$
4
217
1
2
3

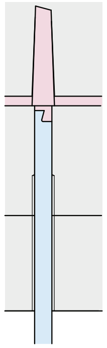
Example

■**Characteristics**

Z groove ejector pins have the function of sprue lock by undercutting of the tip groove.

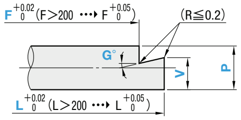


RCPN
(☞ P.811)
Ball plunger
(☞ P.651)
Ejector pin with Z groove processed



■**Ejector Pins with Tip Processed**

5A (Z groove)



F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
(R≦0.2)
G°
V
P
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

- 0° ≦G≦45°
- 1.5≦V<P
- L−F≦10
- V−(L−F)tanG≧1
- ⊗ R designation not available

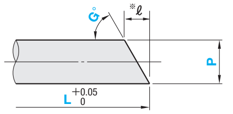
SKH51 equivalent	L dimension designation type	☞ P.97
SKH51 equivalent	L · P dimension designation type	☞ P.99

SHAPE VARIATIONS OF STRAIGHT EJECTOR PINS WITH TIP PROCESS①

—SHAPES 1A～20A—

Shapes 21A ～ 32A
☞ P.95・96

1A (Bezel・angle designation)

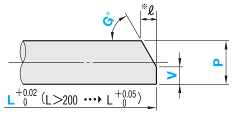


※ℓ calculation

$\ell=\frac{P}{\tan G}$

- $45^\circ \leqq G < 90^\circ$

2A (Partial bezel・angle designation)

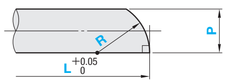

G°
※ℓ
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

※ℓ calculation

$\ell=\frac{P-V}{\tan G}$

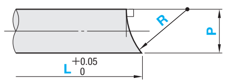
- $45^\circ \leqq G < 90^\circ$
- $1.5 \leqq V < P$

3A (Outward R)



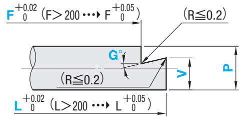
- $P \leqq R \leqq 15$

4A (Inward R)



- $P \leqq R \leqq 15$

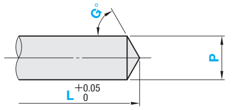
5A (Z groove)


F +0.02 0 (F> 200 ···▸ F +0.05 0)
(R≦0.2)
G°
(R≦0.2)
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

- $0^\circ \leqq G \leqq 45^\circ$
- $1.5 \leqq V < P$
- $L-F \leqq 10$
- $V-(L-F)\tan G \geqq 1$

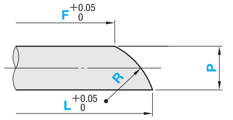
⊗ R designation not available

6A (Cone)



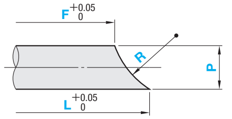
- $45^\circ \leqq G < 90^\circ$

7A (Outward R with F designation)


F +0.05 0
R
P
L +0.05 0

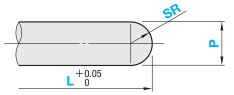
- $L-F \leqq P < R \leqq 15$
- $L-F > R-\sqrt{R^2-P^2}$

8A (Inward R with F designation)


F +0.05 0
R
P
L +0.05 0

- $L-F \leqq P < R \leqq 15$
- $L-F > R-\sqrt{R^2-P^2}$

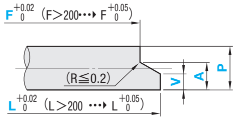
9A (Spherical surface)



- Default: $SR=\frac{P}{2}$

SR may be designated within
- $\frac{P}{2} < SR \leqq 2P$ range.

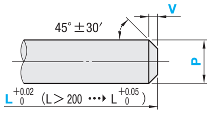
10A (Trapezoid)


F +0.02 0 (F>200··· F +0.05 0)
(R≦0.2)
V
A
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

- $1.5 \leqq V < P$
- $V \leqq A < P$
- $L-F \leqq 5$

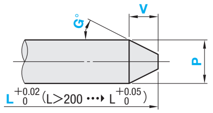
⊗ R designation not available

11A (C chamfered)


45°±30′
V
P
L +0.02 0 (L> 200 ···▸ L +0.05 0)

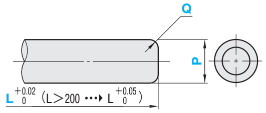
- $0.1 \leqq V \leqq \left(\frac{P}{2}-0.1\right)$

12A (Tapered)


G°
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

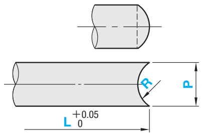
- $0.1 \leqq V \leqq (P\times2), \frac{P}{2}-V\tan G \geqq 0.1$
- $0^\circ < G \leqq 45^\circ$

13A (R chamfered)


Q
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

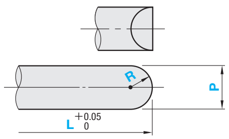
- $0.2 \leqq Q \leqq \left(\frac{P}{2}-0.1\right)$

14A (R groove)



- $(P\times1.2) \leqq R \leqq (P\times2)$

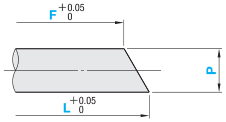
15A (R surface)



- Default: $R=\frac{P}{2}$

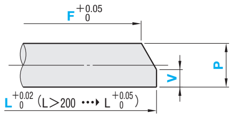
R may be designated within
- $\frac{P}{2} < R \leqq 2P$ range.

16A (Bezel/F specification)


F +0.05 0
P
L +0.05 0

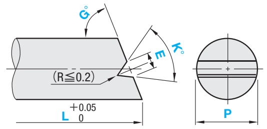
- $0.05 \leqq (L-F) \leqq P$

17A (Partial bezel/F specification)


F +0.05 0
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

- $0.05 \leqq (L-F) \leqq (P-V)$
- $1.5 \leqq V < P$

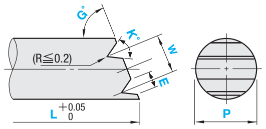
18A (Bezel+1 groove)


G°
K°
E
(R≦0.2)
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq E \leqq 3.0$
- $E \leqq \frac{P}{2}$
- K Selection 60° or 90°

⊗ R designation not available

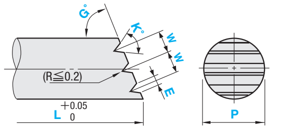
19A (Bezel+2 groove)


G°
K°
W
E
(R≦0.2)
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq E \leqq 3.0$
- $E \leqq \frac{P}{3}$
- $(E+0.2) \leqq W \leqq (P-E-0.4)$
- K Selection 60° or 90°

⊗ R designation not available

20A (Bezel+3 groove)


G°
K°
W
W
E
(R≦0.2)
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq E \leqq 3.0$
- $E \leqq \frac{P}{4}$
- $(E+0.2) \leqq W \leqq \left(P-\frac{E}{2}-0.2\right)$
- K Selection 60° or 90°

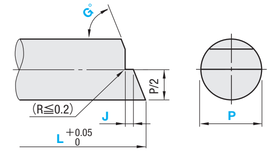
⊗ R designation not available

SHAPE VARIATIONS OF STRAIGHT EJECTOR PINS WITH TIP PROCESS②

—SHAPES 21A～32A—

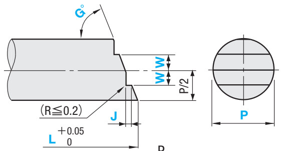
Shapes 1A ～ 20A
P.93・94

21A (Bezel＋1 vertical groove)


G°
P/2
(R≦0.2)
J
L +0.05 0
P

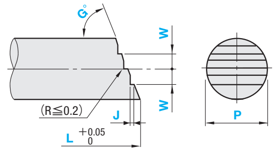
- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq J \leqq 3.0$
- ⊗ R designation not available
- $J \leqq \frac{P}{3\tan G}$

22A (Bezel＋2 vertical groove)


G°
W
W
P/2
(R≦0.2)
J
L +0.05 0
P

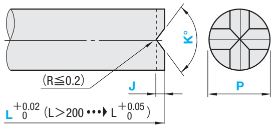
- $45^\circ \leqq G < 90^\circ$
- $J \leqq \frac{P}{4\tan G}$
- $0.3 \leqq J \leqq 3.0$
- $0.1 + J\tan G \leqq W \leqq \left(\frac{P}{2} - 0.2\right)$

23A (Bezel＋3 vertical groove)


G°
W
W
(R≦0.2)
J
L +0.05 0
P

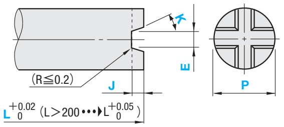
- $45^\circ \leqq G < 90^\circ$
- $J \leqq \frac{P}{5\tan G}$
- $0.3 \leqq J \leqq 3.0$
- $0.1 + J\tan G \leqq W \leqq \left(\frac{P}{2} - 0.2\right)$

24A (Cross groove/Triangle shaped)


K°
(R≦0.2)
J
L +0.02 0 (L>200 ···▸ L +0.05 0)
P

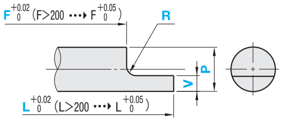
- $0.3 \leqq J \leqq 3.0$
- $J \leqq \frac{P}{3}$
- $30^\circ \leqq K^\circ \leqq 90^\circ$ (5° increments)

25A (Cross groove/Trapezoid-shaped)


K
E
(R≦0.2)
J
L +0.02 0 (L>200 ···▸ L +0.05 0)
P

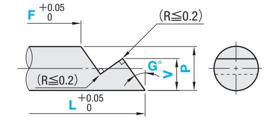
- $0.3 \leqq J \leqq 3.0$
- $E \leqq \frac{P}{3}$
- $0.3 \leqq E \leqq 3.0$
- $0^\circ \leqq K^\circ \leqq 45^\circ$ (5° increments)
- $J \leqq \frac{P}{3}$

26A (L-shaped・R designation)


F +0.02 0 (F>200 ···▸ F +0.05 0)
R
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

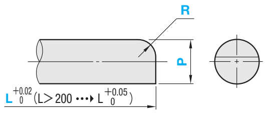
- $0.3 \leqq R \leqq (P - V)$ and $R \leqq (L - F)$
- $0.2 \leqq (L - F) \leqq (V \times 5)$
- $1 \leqq V < P$

27A (Bezel・Z groove)


F +0.05 0
(R≦0.2)
(R≦0.2)
G°
V
P
L +0.05 0

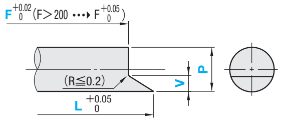
- $1 \leqq (L - F) \leqq (V \times 5)$ $1.5 \leqq V < P$
- $0^\circ < G \leqq 45^\circ$
- ⊗ R designation not available

28A (Half R)


R
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

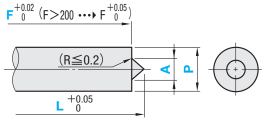
- $(P \times 0.1) \leqq R < (P \times 0.8)$

29A (L-shaped・Tapered)


F +0.02 0 (F>200 ···▸ F +0.05 0)
(R≦0.2)
V
P
L +0.05 0

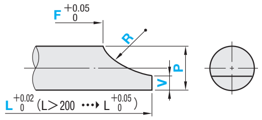
- $0.2 \leqq (L - F) \leqq V \times 5$
- $0.3 \leqq V < P$
- ⊗ R designation not available

30A (Umbo)


F +0.02 0 (F>200 ···▸ F +0.05 0)
(R≦0.2)
A
P
L +0.05 0

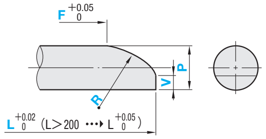
- $1 \leqq A \leqq (P - 1)$ and $\frac{P}{3} \leqq A$
- $1 \leqq (L - F) \leqq (A \times 3)$
- ⊗ R designation not available

31A (Inward R with F/V designation)


F +0.05 0
R
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

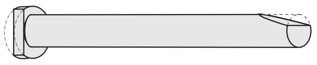
- $P < R \leqq 15$
- $1.5 \leqq V < P$
- $L - F > R - \sqrt{R^2 - (P - V)^2}$

32A (Outward R with F/V designation)

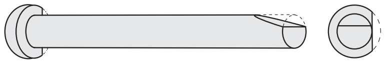

F +0.05 0
R
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

- $P < R \leqq 15$
- $1.5 \leqq V < P$
- $L - F > R - \sqrt{R^2 - (P - V)^2}$

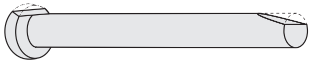
■Flats cutting position for 2A shape



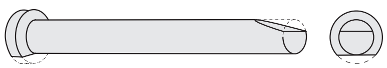
AKC0



AKC180

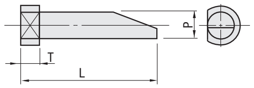


AKC90



AKC270

■Products list

Classification \ Shape						
Material	Head Thickness (T)	Shaft Diameter (P) Tolerance	Tip Processed			
			L dimension designation type		L/P dimension designation type	
			Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	$^{\ 0}_{-0.005}$	EPH□A	P.97	EPHB□A	P.99
		$^{-0.01}_{-0.02}$	EPHE□A		EPHBE□A	
	6・8mm (JIS)	$^{\ 0}_{-0.005}$	EPHJ□A		EPHJB□A	
		$^{-0.01}_{-0.02}$	EPHJE□A		EPHJBE□A	
SKD61 equivalent ＋ Nitrided	4mm (T4)	$^{-0.01}_{-0.02}$	EPN□A	P.101	EPNB□A	P.103
	6・8mm (JIS)		EPJ□A		EPJB□A	
SKD61 equivalent	4mm (T4)	$^{\ 0}_{-0.005}$	EPDS□A	P.105	EPDBS□A	P.107
		$^{-0.01}_{-0.02}$	EPD□A		EPDB□A	

■Unit of designation

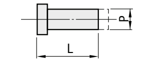
T	Unit of designation
G±30'	1° increments
K±30'	18A・19A・20A 60° or 90° Selection
	24A・25A 5° increments
SKH51 equivalent R±0.02 (15A・26A ···▸ R±0.1) SKD61 equivalent R±0.1 SKD61 equivalent＋Nitrided R±0.1	0.1mm increments
SR±0.1	0.1mm increments
A±0.05	0.1mm increments
V ±0.05	0.1mm increments
E±0.02	0.1mm increments
J ±0.02	0.1mm increments
W±0.02	0.1mm increments
Q±0.1	0.1mm increments
F(For tolerance, refer to the drawing)	0.01mm increments

High Speed Steel
SKH51 equivalent

STRAIGHT EJECTOR PINS WITH TIP PROCESS

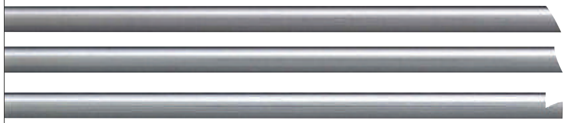
—L DIMENSION DESIGNATION TYPE—

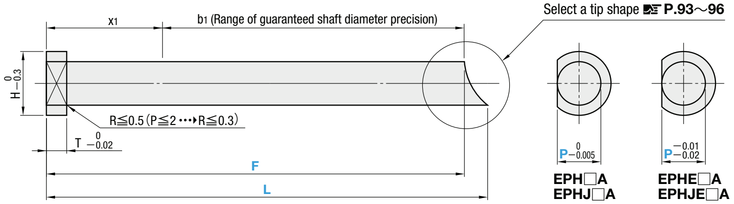
L dimension designation type



Ⓘ Non JIS material definition is listed on P.1351 - 1352

RoHS





Ⓘ To determine the shape position, key flat cutting is made at the standard 0°

Part Number	Head thickness	T P
EPH□A	4mm(T4)	0 −0.005
EPHJ□A	6・8mm(JIS)	
EPHE□A	4mm(T4)	−0.01 −0.02
EPHJE□A	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (Details P.1301)

Head Thickness (T)	L	x1 max.
T4	50.00~200.00	30
JIS		35
T4・JIS	200.01~250.00	110
	250.01~300.00	160
	300.01~350.00	210

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness
(Details P.1303)

4mm head		JIS head		Part Number				0.01mm increments
H	T	H	T	Type 4mm head	Type JIS Head	Tip shapes	P	L
3	4	—	—	EPH (P 0 −0.005) EPHE (P −0.01 −0.02)	—	1A 11A 21A 31A 2A 12A 22A 32A 3A 13A 23A 4A 14A 24A 5A 15A 25A 6A 16A 26A 7A 17A 27A 8A 18A 28A 9A 19A 29A 10A 20A 30A	1.5	50.00~250.00
4							2	50.00~300.00
5							2.5	
6							3	
7							3.5	
		8	6		EPHJ (P 0 −0.005) EPHJE (P −0.01 −0.02)		4	50.00~350.00(50.00~300.00)
8							4.5	50.00~350.00
		9					5	
9							5.5	
		10					6	
10		11					6.5	
							7	
11		13	8				8	
14		14					9	
15		15					10	
17		17					12	

Ⓘ Select the tip shape 1A~32A P.93~96. Ⓘ L ( ) will be available for JIS head only.
Ⓘ For JIS head type less than P4 is T=4, please place the order for 4mm head type of EPH□A (0 −0.005), EPHE□A (−0.01 −0.02).

Order

Part Number				L		Sequence of A/V/E/J/W/R/SR/F/G/K/Q
Type	Tip shapes	P	—		—	
EPHJ	2A	10	—	200.00	—	V5.0 —G70

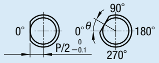
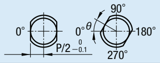
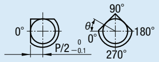
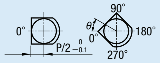
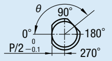
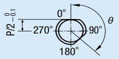
Days to Ship **Quotation**

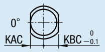
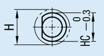
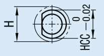
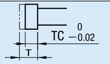
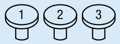
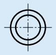
Alterations

Part Number — L — A・V・E・J・W・R・SR・F・G・K・Q — (AKC・AWC···etc.)
EPHJ2A 10 — 200.00 — V5.0 —G70 — TC6

Quotation

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments Ⓘ 0<AKC<360 Ⓘ No need to designate AKC0	
	AWC	AWC=1° increments Ⓘ 0≦AWC<360	
	ARC	ARC=1° increments Ⓘ 0≦ARC<360	Quotation
	ADC	ADC=1° increments Ⓘ 0≦ADC<360	
	KGA	KGA=1° increments Ⓘ 0<KGA<360	
	KGB	KGB=1° increments Ⓘ 0<KGB<360	

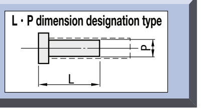
Alterations	Code	Spec.	1Code
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	
	HC	HC=0.1mm increments Ⓘ P+1≦HC<H	
	HCC	HCC=0.1mm increments Ⓘ P+1≦HCC<H−0.3	
	TC	TC=0.1mm increments Ⓘ T/2≦TC<T (Dimensions L and F remain unchanged) Ⓘ T−TC≦Lmax.−L	Quotation
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	NKC	Without key flat cutting Ⓘ Available for tip shapes 6A・9A・11A・12A・13A・30A Ⓘ Combination only with HC・HCC・TC・NHC・NHN available.	

Price **Quotation**

High Speed Steel
SKH51 equivalent

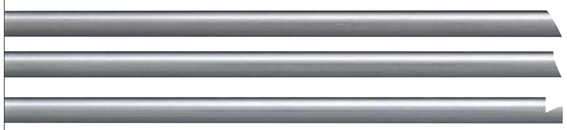
STRAIGHT EJECTOR PINS WITH TIP PROCESS

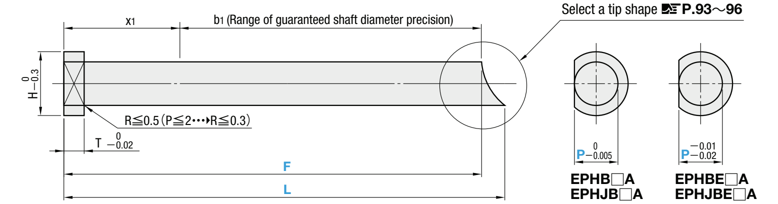
—L・P DIMENSION DESIGNATION TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS





To determine the shape position, key flat cutting is made at the standard 0°

Part Number	Head thickness	T P
EPHB□A	4mm(T4)	0 −0.005
EPHJB□A	6・8mm(JIS)	
EPHBE□A	4mm(T4)	−0.01 −0.02
EPHJBE□A	6・8mm(JIS)	

Range of guaranteed shaft diameter precision
(Details P.1301)

Head Thickness (T)	L	x1 max.
T4	50.00～200.00	30
JIS		35
T4・JIS	200.01～250.00	110
	250.01～300.00	160
	300.01～350.00	210

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details P.1303)

4mm head		JIS head		Part Number				0.01mm increments	
H	T	H	T	Type: 4mm head	Type: JIS Head	Tip shapes	No.	L	P
4	4	—	—	EPHB (P 0 −0.005) EPHBE (P −0.01 −0.02)	—	1A 11A 21A 31A 2A 12A 22A 32A 3A 13A 23A 4A 14A 24A 5A 15A 25A 6A 16A 26A 7A 17A 27A 8A 18A 28A 9A 19A 29A 10A 20A 30A	2	50.00～250.00	1.50～ 1.99
5							2.5	50.00～300.00	2.00～ 2.49
6							3		2.50～ 2.99
7							3.5		3.00～ 3.49
		8	6		EPHJB (P 0 −0.005) EPHJBE (P −0.01 −0.02)		4		3.50～ 3.99
8							4.5	50.00～350.00	4.00～ 4.49
		9					5		4.50～ 4.99
9							5.5		5.00～ 5.49
		10					6		5.50～ 5.99
10		11					6.5		6.00～ 6.49
							7		6.50～ 6.99
11		13	8				8		7.00～ 7.99
15		15					10		8.00～ 9.99
17		17					12		10.00～11.99

Select the tip shape 1A～32A P.93～96.
For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPHB□A (0 −0.005), EPHBE□A (−0.01 −0.02).

Order

Part Number								
Type	Tip shapes	No.	—	L	—	P	—	Sequence of A/V/E/J/W/R/SR/F/G/K/Q
EPHJB	2A	10	—	200.00	—	P9.80	—	V5.0 —G70

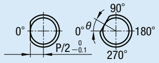
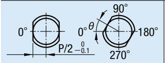
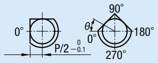
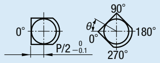
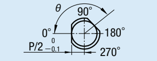
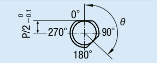
Days to Ship Quotation

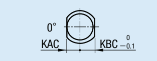
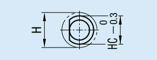
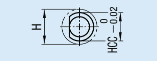
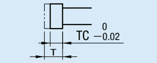
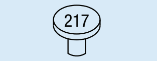
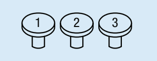
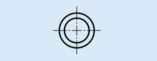
Alterations

Part Number	—	L	—	P	—	A・V・E・J・W・R・SR・F・G・K・Q	—	(AKC・AWC…etc.)
EPHJB3A 6	—	100.00	—	P5.70	—	R10	—	TC5

Quotation

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	

Alterations	Code	Spec.	1Code
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 Combination with other key flat cutting not available	Quotation
	HC	HC=0.1mm increments P+1≦HC<H	
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3	
	TC	TC=0.1mm increments T/2≦TC<T (Dimensions L and F remain unchanged) T−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	NKC	Without key flat cutting Available for tip shapes 6A・9A・11A・12A・13A・30A Combination only with HC・HCC・TC・NHC・NHN available.	

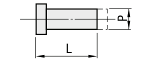
Price Quotation

Dies Steel
SKD61 equivalent
+
Nitriding

STRAIGHT EJECTOR PINS WITH TIP PROCESS

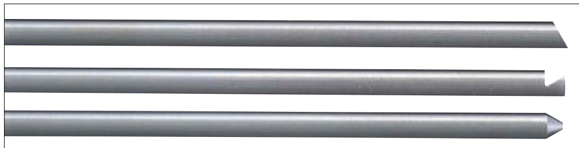
—L DIMENSION DESIGNATION TYPE—

L dimension designation type

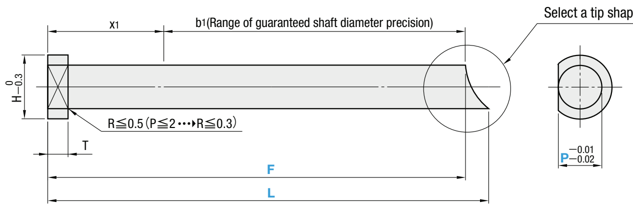


Non JIS material definition is listed on P.1351 - 1352

RoHS



Select a tip shape P.93～96



To determine the shape position, key flat cutting is made at the standard 0°

Part Number	Head thickness	T T	T P
EPN□A	4mm(T4)	0 −0.02	−0.01 −0.02
EPJ□A	6 • 8mm(JIS)	0 −0.05	

Range of guaranteed shaft diameter precision
(Details P.1301)

Head Thickness (T)	L	x1 max.
T4	50.00～300.00	30
JIS		35
T4 • JIS	300.01～350.00	210

M SKD61 equivalent+Nitrided
H Surface base:900HV～
Base material:40～45HRC

Range of guaranteed base material hardness
(Details P.1303)

Range of guaranteed surface hardness for nitriding
(Details P.1303)

4mm head		JIS head		Part Number				0.01mm increments
H	T	H	T	Type		Tip shapes	P	L
				4mm head	JIS Head			
3	4	–	–	EPN	–	1A 11A 21A 31A 2A 12A 22A 32A 3A 13A 23A 4A 14A 24A 5A 15A 25A 6A 16A 26A 7A 17A 27A 8A 18A 28A 9A 19A 29A 10A 20A 30A	1.5	50.00～200.00
4							2	50.00～250.00
5							2.5	
6							3	50.00～300.00
7							3.5	
		8	6		EPJ		4	
8							4.5	50.00～350.00
		9					5	
9							5.5	
		10					6	
10		11					6.5	
							7	
11		13	8				8	
15		15					10	
17		17					12	

The shaped tip has the same hardness as its base material.
Select the tip shape 1A～32A **P.93～96.**
For JIS head type less than P4 is T=4, please place the order for 4mm head type of EPN□A

Order

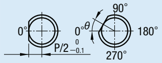
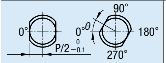
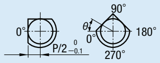
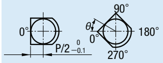
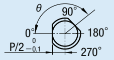
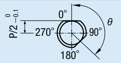
Part Number				L		Sequence of A/V/E/J/W/R/SR/F/G/K/Q
Type	Tip shapes	P	—		—	
EPJ	2A	10	—	200.00	—	V5.0 — G70

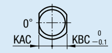
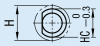
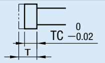
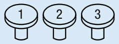
Days to Ship Quotation

Alterations

Part Number — L — A·V·E·J·W·R·SR·F·G·K·Q — (AKC · AWC···etc.)
EPJ2A 10 — 200.00 — V5.0 —G70 — TC6

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	Quotation
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	

Alterations	Code	Spec.	1Code
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	
	HC	HC=0.1mm increments P+1≦HC<H	
	TC	TC=0.1mm increments T/2≦TC<T (Dimensions L and F remain unchanged) T−TC≦Lmax.−L	Quotation
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	NKC	Without key flat cutting Available for tip shapes 6A • 9A • 11A • 12A • 13A • 30A Combination only with HC • TC • NHC • NHN available.	

Price Quotation

Straight Ejector Pins

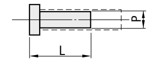
Dies Steel
SKD61 equivalent
+
Nitriding

Dies Steel
SKD61 equivalent
+
Nitriding

STRAIGHT EJECTOR PINS WITH TIP PROCESS

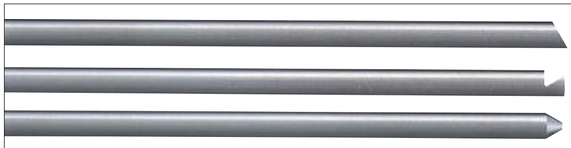
—L・P DIMENSION DESIGNATION TYPE—

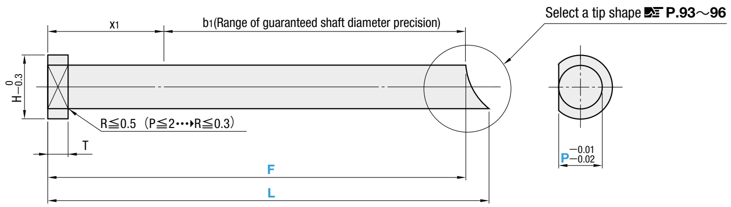
L・P dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS





X1
b1(Range of guaranteed shaft diameter precision)
Select a tip shape P.93～96
H 0 −0.3
R≦0.5（P≦2…R≦0.3）
T
F
L
P −0.01 −0.02

To determine the shape position, key flat cutting is made at the standard 0°

Part Number	Head thickness	T T	T P
EPNB□A	4mm(T4)	0 −0.02	−0.01 −0.02
EPJB□A	6・8mm(JIS)	0 −0.05	

Range of guaranteed shaft diameter precision
(Details **P.1301**)

Head Thickness (T)	L	x1 max.
T4	50.00～300.00	30
JIS		35
T4 JIS	300.01～350.00	210

M SKD61 equivalent+Nitrided
H Surface base:900HV～
Base material:40～45HRC

Range of guaranteed base material hardness
(Details **P.1303**)

Range of guaranteed surface hardness for nitriding
(Details **P.1303**)

4mm head		JIS head		Part Number				0.01mm increments	
H	T	H	T	Type		Tip shapes	No.	L	P
				4mm head	JIS head				
4	4	–	–	EPNB	–	1A 11A 21A 31A 2A 12A 22A 32A 3A 13A 23A 4A 14A 24A 5A 15A 25A 6A 16A 26A 7A 17A 27A 8A 18A 28A 9A 19A 29A 10A 20A 30A	2	50.00 ～ 250.00	1.50～ 1.99
5							2.5		2.00～ 2.49
6							3	50.00 ～ 300.00	2.50～ 2.99
7							3.5		3.00～ 3.49
		8	6		EPJB		4		3.50～ 3.99
8							4.5		4.00～ 4.49
		9					5	50.00 ～ 350.00	4.50～ 4.99
9							5.5		5.00～ 5.49
		10					6		5.50～ 5.99
10		11					6.5		6.00～ 6.49
							7		6.50～ 6.99
11		13	8				8		7.00～ 7.99
15		15					10		8.00～ 9.99
17		17					12		10.00～11.99

The shaped tip has the same hardness as its base material. Since nitriding is performed after P dimension machining, the head may also be nitrided.
Select the tip shape 1A～32A **P.93～96.**
For JIS head type less than No.4 is T=4, please place the order for 4mm head type of EPNB□A

Order

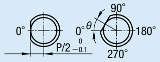
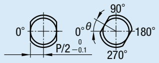
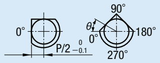
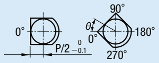
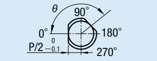
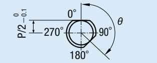
Part Number				L		P		Sequence of A/V/E/J/W/R/SR/F/G/K/Q
Type	Tip shapes	No.						
EPJB	2A	10	—	200.00	—	P8.50	—	V5.0 — G70

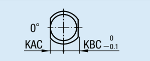
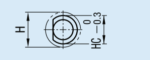
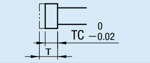
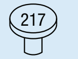
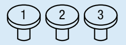
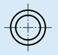
Days to Ship **Quotation**

Alterations

Part Number — L — P — A・V・E・J・W・R・SR・F・G・K・Q — (AKC・AWC…etc.)
EPJB2A 10 — 200.00 — P8.50 — V5.0 — G70 — TC6

Alteration details **P.53**

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	**AWC**	AWC=1° increments 0≦AWC<360	
	**ARC**	ARC=1° increments 0≦ARC<360	
	**ADC**	ADC=1° increments 0≦ADC<360	
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGB**	KGB=1° increments 0<KGB<360	

Alterations	Code	Spec.	1Code
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	Quotation
	**HC**	HC=0.1mm increments P+1≦HC<H	
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimensions L and F remain unchanged) T−TC≦Lmax.−L	
	**NHC**	Numbering on the head How to order **P.54**	
	**NHN**	Automatic sequential numbering on the head How to order **P.54**	
	**NKC**	Without key flat cutting Available for tip shapes 6A・9A・11A・12A・13A・30A Combination only with HC・TC・NHC・NHN available.	

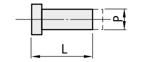
Price **Quotation**

Dies Steel
SKD61 equivalent
4mm head

STRAIGHT EJECTOR PINS WITH TIP PROCESS

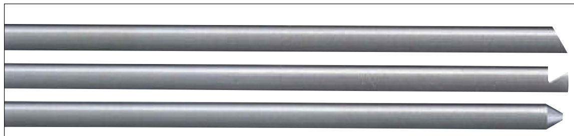
— L DIMENSION DESIGNATION TYPE —

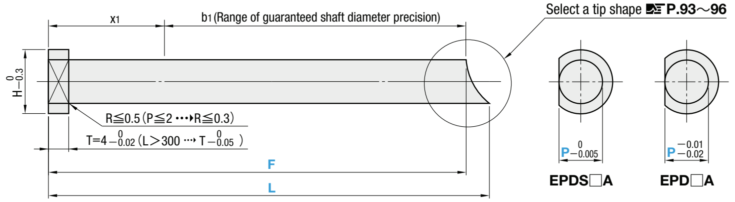
L dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS





Select a tip shape P.93～96
x1
b1 (Range of guaranteed shaft diameter precision)
H 0 −0.3
R≦0.5 (P≦2 ···R≦0.3)
T=4 0 −0.02 (L>300 ··· T 0 −0.05)
F
L
P 0 −0.005
P −0.01 −0.02

EPDS□A **EPD□A**

To determine the shape position, key flat cutting is made at the standard 0˚

Part Number	Head thickness	T P
EPDS□A	4mm(T4)	0 −0.005
EPD□A		−0.01 −0.02

Range of guaranteed shaft diameter precision (Details P.1301)

L	x1 max.
50.00～150.00	30
150.01～200.00	60
200.01～250.00	110
250.01～300.00	160
300.01～350.00	210

M SKD61 equivalent
H 50 ～ 55HRC

Range of guaranteed base material hardness (Details P.1303)

H	T	Part Number			0.01mm increments
		Type	Tip shapes	P	L
3	4	EPDS (P 0 −0.005) EPD (P −0.01 −0.02)	1A 11A 21A 31A 2A 12A 22A 32A 3A 13A 23A 4A 14A 24A 5A 15A 25A 6A 16A 26A 7A 17A 27A 8A 18A 28A 9A 19A 29A 10A 20A 30A	1.5	50.00～250.00
4				2	
5				2.5	
6				3	50.00～300.00
7				3.5 4	
8				4.5 5	
9				5.5 6	50.00～350.00
10				6.5 7	
11				8	
15				10	
17				12	

Select the tip shape 1A～32A P.93～96.

Order

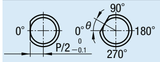
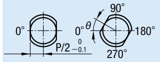
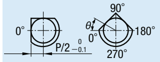
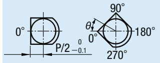
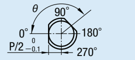
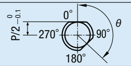
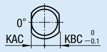
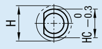
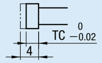
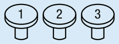
Part Number				L		Sequence of A/V/E/J/W/R/SR/F/G/K/Q
Type	Tip shapes	P	—		—	
EPD	2A	10	—	200.00	—	V5.0 —G70

Days to Ship Quotation

Alterations

Part Number — L — A·V·E·J·W·R·SR·F·G·K·Q — (AKC · AWC···etc.)
EPD2A 10 — 200.00 — V5.0 —G70 — TC2

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1˚ increments 0<AKC<360 No need to designate AKC0	
	AWC	AWC=1˚ increments 0≦AWC<360	
	ARC	ARC=1˚ increments 0≦ARC<360	Quotation
	ADC	ADC=1˚ increments 0≦ADC<360	
	KGA	KGA=1˚ increments 0<KGA<360	
	KGB	KGB=1˚ increments 0<KGB<360	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 Combination with other key flat cutting not available	
	HC	HC=0.1mm increments P+1≦HC<H	
	TC	TC=0.1mm increments 2.0≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	Quotation
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	NKC	Without key flat cutting Available for tip shapes 6A · 9A · 11A · 12A · 13A · 30A Combination only with HC · TC · NHC · NHN available.	

Price Quotation

Straight Ejector Pins

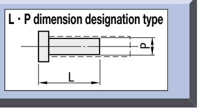
Dies Steel SKD61 equivalent

Dies Steel
SKD61 equivalent
4mm head

STRAIGHT EJECTOR PINS WITH TIP PROCESS

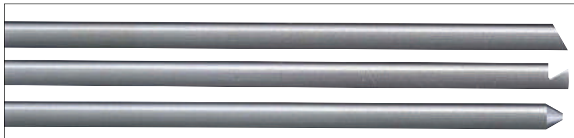
—L・P DIMENSION DESIGNATION TYPE—

L・P dimension designation type

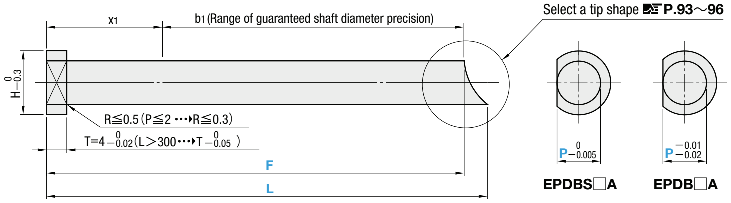


Non JIS material definition is listed on P.1351 - 1352

RoHS



Select a tip shape P.93～96


x1
b1 (Range of guaranteed shaft diameter precision)
H 0/−0.3
R≦0.5 (P≦2 ⋯▸R≦0.3)
T=4 0/−0.02 (L>300⋯▸T 0/−0.05)
F
L
P 0/−0.005
P −0.01/−0.02

EPDBS□A **EPDB□A**

To determine the shape position, key flat cutting is made at the standard 0˚

Part Number	Head thickness	T P
EPDBS□A	4mm(T4)	0 −0.005
EPDB□A		−0.01 −0.02

Range of guaranteed shaft diameter precision
(Details P.1301)

L	x1 max.
50.00～150.00	30
150.01～200.00	60
200.01～250.00	110
250.01～300.00	160
300.01～350.00	210

M SKD61 equivalent
H 50～55HRC

Range of guaranteed base material hardness
(Details P.1303)

H	T	Part Number			0.01mm increments	
		Type	Tip shapes	No.	L	P
4	4	EPDBS (P 0/−0.005) EPDB (P −0.01/−0.02)	1A 11A 21A 31A 2A 12A 22A 32A 3A 13A 23A 4A 14A 24A 5A 15A 25A 6A 16A 26A 7A 17A 27A 8A 18A 28A 9A 19A 29A 10A 20A 30A	2	50.00～250.00	1.50～ 1.99
5				2.5		2.00～ 2.49
6				3	50.00～300.00	2.50～ 2.99
7				3.5		3.00～ 3.49
				4		3.50～ 3.99
8				4.5		4.00～ 4.49
				5	50.00～350.00	4.50～ 4.99
9				5.5		5.00～ 5.49
				6		5.50～ 5.99
10				6.5		6.00～ 6.49
				7		6.50～ 6.99
11				8		7.00～ 7.99
15				10		8.00～ 9.99
17				12		10.00～11.99

Select the tip shape 1A～32A P.93～96.

Order

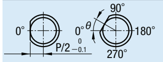
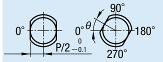
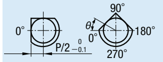
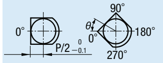
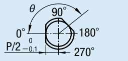
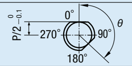
Part Number			—	L	—	P	—	Sequence of A/V/E/J/W/R/SR/F/G/K/Q
Type	Tip shapes	No.						
EPDB	2A	10	—	200.00	—	P9.80	—	V5.0 —G70

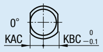
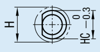
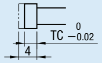
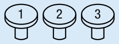
Days to Ship Quotation

Alterations

Part Number — L — P — A・V・E・J・W・R・SR・F・G・K・Q — (AKC・AWC⋯etc.)
EPDB2A 10 — 200.00 — P9.80 — V5.0 —G70 — TC2

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1˚ increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	AWC=1˚ increments 0≦AWC<360	
	ARC	ARC=1˚ increments 0≦ARC<360	
	ADC	ADC=1˚ increments 0≦ADC<360	
	KGA	KGA=1˚ increments 0<KGA<360	
	KGB	KGB=1˚ increments 0<KGB<360	

Alterations	Code	Spec.	1Code
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 Combination with other key flat cutting not available	Quotation
	HC	HC=0.1mm increments P+1≦HC<H	
	TC	TC=0.1mm increments 2.0≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	NKC	Without key flat cutting Available for tip shapes 6A・9A・11A・12A・13A・24A・25A・30A Combination only with HC・TC・NHC・NHN available.	

0°
P/2 0/−0.1
θ
90°
180°
270°
KAC
KBC 0/−0.1
H
HC 0/−0.3
TC 0/−0.02
4
217
1
2
3

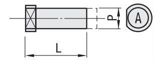
Price Quotation

High Speed Steel
SKH51 equivalent

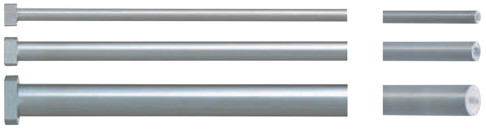
STRAIGHT EJECTOR PINS WITH ENGRAVING

—L DIMENSION DESIGNATION TYPE—

L Dimension Designation Type

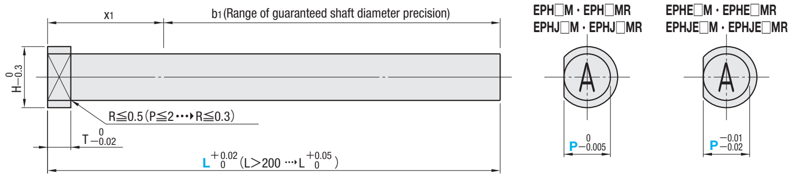


❗ Non JIS material definition is listed on P.1351 - 1352



RoHS

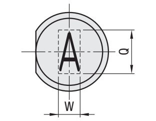
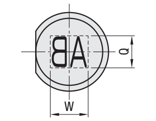
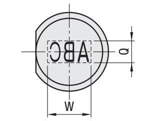
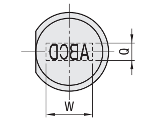
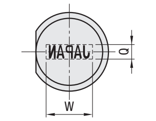
Part Number Type	Part Number Character	Head thickness	T P
EPH	□M □MR (Sequential numbering designation)	4mm(T4)	$^{\ 0}_{-0.005}$
EPHJ		6 · 8mm(JIS)	
EPHE		4mm(T4)	$^{-0.01}_{-0.02}$
EPHJE		6 · 8mm(JIS)	



❗ To determine the engraving position, key flat cutting is made at the standard 0°

Range of guaranteed shaft diameter precision (Details ☞ **P.1301**)
T4 ⋯› x1 max.30
JIS ⋯› x1 max.35

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details ☞ **P.1303**)

1M · 1MR (1 character)	**2M · 2MR** (2 characters)	**3M** (3 characters)	**4M** (4 characters)	**5M** (5 characters)
				
0.3≦P≦12	1.5≦P≦12	2.8≦P≦12	3.6≦P≦12	4.5≦P≦12

❗ Designate characters in the right reading order to appear on the finished products. ❗ Refer to ☞ **P.118** for character font.

4mm head		JIS head		Part Number				0.01mm increments	Characters for engraving (Round Gothic type)
H	T	H	T	Type 4mm head	Type JIS head	Character	P	L	
3	4	—	—	EPH $(P^{\ 0}_{-0.005})$ EPHE $(P^{-0.01}_{-0.02})$	—	1M 2M 3M 4M 5M	0.3	40.00~ 60.00	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
							0.4 0.5	40.00~100.00	
							0.6 0.7 0.8 0.9	40.00~150.00	
							1 1.1 1.2 1.3 1.4	40.00~200.00	
							1.5	40.00~250.00	
4							1.6	40.00~250.00	
							1.7 1.8 1.9	40.00~200.00	
							2	40.00~250.00	
5							2.1	40.00~250.00	
							2.2 2.3 2.4	40.00~200.00	
							2.5	40.00~250.00	
6							2.6	40.00~250.00	
							2.7 2.8 2.9	40.00~200.00	
							3	40.00~250.00	
7							3.1	40.00~250.00	
							3.2 3.3 3.4	40.00~200.00	
							3.5 3.6	40.00~250.00	
							3.7 3.8 3.9	40.00~200.00	
		8	6		EPHJ $(P^{\ 0}_{-0.005})$ EPHJE $(P^{-0.01}_{-0.02})$	Sequential numbering designation 1MR 2MR	4	40.00~250.00	
8							4.5		
		9					5		
9							5.5		
		10					6		
10		11					6.5		
							7		
11		13	8				8		
14		14					9		
15		15					10		
17		17					12		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	>	>
Less	<	<
Plus	+	+
Minus	—	#
Space	⬚	%
Centered dot	•	@
Period	.	&

❗ Use ¥ for indicating ／(slash), # for —(minus), % for ⬚(space), @ for • (centered dot), and & for . (period).
❗ 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
❗ In case of 1MR,"0" is next to "9" while "A" is next to "Z".
❗ In case of 2MR, the 1st digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the 2nd digit is increased by one.
⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.

1MR (Example)
- When placing the order for 5 pieces of EPH1MR2—150—1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of EPH1MR3—150—Z, characters for engraving "Z A B"

2MR (Example)
- When placing the order for 4 pieces of EPH2MR4—100—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of EPH2MR4—100—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of EPH2MR6—150—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

■No. of characters and shaft diameter (P)

No. of characters	P
1M · 1MR (1 character)	0.3~12
2M · 2MR (2 characters)	1.5~12
3M (3 characters)	2.8~12
4M (4 characters)	3.6~12
5M (5 characters)	4.5~12

Order

Part Number Type	Part Number Character	Part Number P		L		Characters for engraving (0~9, A~Z ／><+—⬚•.)
EPH	5M	6	—	200.00	—	ABC20
EPH	3M	5	—	184.25	—	@ ¥ +

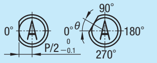
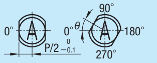
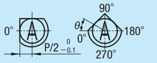
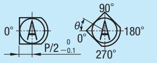
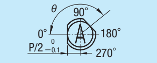
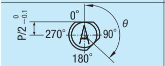
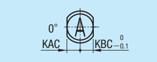
Days to Ship Quotation

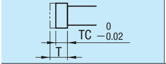
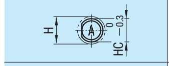
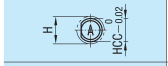
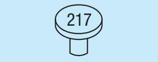
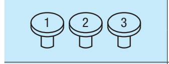
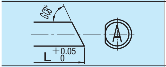
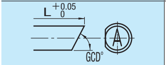
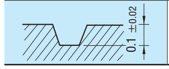
Alterations

Part Number		L		Characters for engraving		(AKC · AWC⋯etc.)
EPH5M 6	—	200.00	—	ABC20	—	AKC120

Quotation

Alteration details ☞ P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments ❗ 0<AKC<360 ❗ When combined with GCB/GCD, 90° increments only ❗ No need to designate AKC0	
	AWC	AWC=1° increments ❗ 0≦AWC<360 ❗ When combined with GCB/GCD, 90° increments only	
	ARC	ARC=1° increments ❗ 0≦ARC<360 ❗ When combined with GCB/GCD, 90° increments only	Quotation
	ADC	ADC=1° increments ❗ 0≦ADC<360 ❗ When combined with GCB/GCD, 90° increments only	
	KGA	KGA=1° increments ❗ 0<KGA<360	
	KGB	KGB=1° increments ❗ 0<KGB<360	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments ❗ T/2≦TC<T, P≧1.5 (Dimension L remains unchanged.) ❗ T—TC≦Lmax.—L	
	HC	HC=0.1mm increments ❗ P+1≦HC<H, P≧1.5	
	HCC	HCC=0.1mm increments ❗ P+1≦HCC<H—0.3, P≧1.5	
	NHC	Numbering on the head How to order ☞ **P.54**	Quotation
	NHN	Automatic sequential numbering on the head How to order ☞ **P.54**	
	GCB	GCB=1° increments ❗ 60≦GCB<90 ❗ L≦200, Available when P≧2 ⊗ Combination with GCD not available.	
	GCD	GCD=1° increments ❗ 60≦GCD<90 ❗ L≦200, Available when P≧2 ⊗ Combination with GCB not available.	
	EC	Engraving depth alteration 0.05 ⋯› 0.1 ❗ Available when P≧1 ⊗ Combination with GCB, GCD not available.	

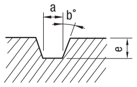
■Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1M **1MR** (1 character)	0.3	0.2	0.1
	0.4	0.25	0.13
	0.5	0.35	0.18
	0.6~ 0.7	0.4	0.2
	0.8~ 0.9	0.6	0.3
	1 ~ 1.2	0.8	0.4
	1.3~ 1.4	1.0	0.5
	1.5~ 1.9	1.2	0.6
	2 ~ 2.4	1.5	0.8
	2.5~ 3.4	2.0	1.0
	3.5~ 4	3.0	1.5
	4.5~ 5	4.0	2.0
	5.5~12	5.0	2.5

No. of characters	P	Q	W
2M **2MR** (2 characters)	1.5~ 1.9	0.7	1.1
	2 ~ 2.2	0.8	1.2
	2.3~ 2.9	1.0	1.3
	3 ~ 3.9	1.5	2.0
	4 ~ 4.5	2.0	2.6
	5 ~ 5.5	2.5	3.3
	6 ~ 7	3.0	3.9
	8 ~12	4.0	5.2
3M (3 characters)	2.8~ 3	0.8	1.8
	3.1~ 4	1.0	2.1
	4.5~ 5	1.5	3.2
	5.5~ 6.5	2.0	4.2
	7 ~12	2.5	5.3
4M (4 characters)	3.6~ 3.8	0.8	2.4
	3.9~ 5	1.0	2.9
	5.5~ 6.5	1.5	4.4
	7 ~12	2.0	5.8
5M (5 characters)	4.5~ 4.9	0.8	3.0
	5 ~ 6.5	1.0	3.7
	7 ~12	1.5	5.6

Ejector pins	Finished products
Reversed reading (Concave character)	Right reading (Convex character)

Details of engraving



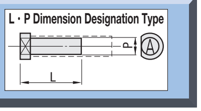
Width of engraving (a)	0.1×Q~0.2×Q
Angle of engraving (b°)	35° ±2°
Depth of engraving (e)	When P≦0.9 0.03±0.01 When P≧1 0.05±0.02 When EC code is used 0.1±0.02

P Price Quotation

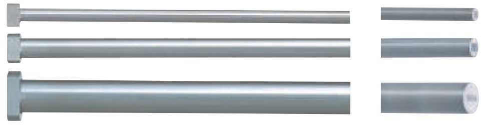
High Speed Steel
SKH51 equivalent

STRAIGHT EJECTOR PINS WITH ENGRAVING

—L・P DIMENSION DESIGNATION TYPE—

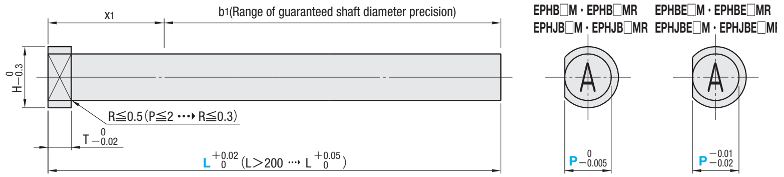


Non JIS material definition is listed on P.1351 - 1352



RoHS

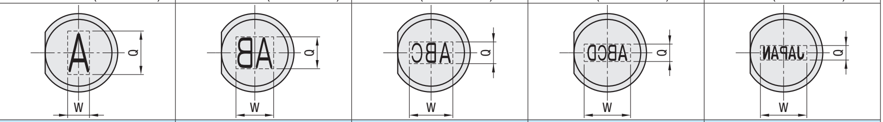
Part Number		Head thickness	T P
Type	Character		
EPHB	□M	4mm(T4)	$^{0}_{-0.005}$
EPHJB	□MR	6・8mm(JIS)	
EPHBE	(Sequential numbering designation)	4mm(T4)	$^{-0.01}_{-0.02}$
EPHJBE		6・8mm(JIS)	



To determine the engraving position, key flat cutting is made at the standard 0°

Range of guaranteed shaft diameter precision (Details P.1301)
T4 ···▸ x_1 max.30 (L>200 ···▸ x_1 max.=110)
JIS ···▸ x_1 max.35 (L>200 ···▸ x_1 max.=110)

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)



1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
0.40≦P≦11.99	1.50≦P≦11.99	2.80≦P≦11.99	3.60≦P≦11.99	4.50≦P≦11.99

Designate characters in the right reading order to appear on the finished products. Refer to P.118 for character font.

4mm head		JIS head		Part Number				0.01mm increments	
H	T	H	T	Type 4mm head	Type JIS head	Character	No.	L	P
3	4	—	—	EPHB ($P^{0}_{-0.005}$) EPHBE ($P^{-0.01}_{-0.02}$)	—	1M 2M 3M 4M 5M Sequential numbering designation 1MR 2MR	0.6	40.00~100.00	0.40~ 0.59
							1	40.00~150.00	0.60~ 0.99
							1.5	40.00~200.00	1.00~ 1.49
4							2	40.00~250.00	1.50~ 1.99
5							2.5		2.00~ 2.49
6							3		2.50~ 2.99
7							3.5		3.00~ 3.49
		8	6		EPHJB ($P^{0}_{-0.005}$) EPHJBE ($P^{-0.01}_{-0.02}$)		4		3.50~ 3.99
8							4.5		4.00~ 4.49
		9					5		4.50~ 4.99
9							5.5		5.00~ 5.49
		10					6		5.50~ 5.99
10		11					6.5		6.00~ 6.49
							7		6.50~ 6.99
11		13	8				8		7.00~ 7.99
15		15					10		8.00~ 9.99
17		17					12		10.00~11.99

Characters for engraving (Round Gothic type)

0 1 2 3 4
5 6 7 8 9
A B C D E
F G H I J
K L M N O
P Q R S T
U V W X Y
Z

Name	Characters for engraving	Order code
Slash	／	¥
Greater	>	>
Less	<	<
Plus	+	+
Minus	—	#
Space	⬚	%
Centered dot	•	@
Period	.	&

- Use ¥ for indicating ／(slash), # for —(minus), % for ⬚(space), @ for • (centered dot), and & for . (period).
- 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
- In case of 1MR,"0" is next to "9" while "A" is next to "Z".
- In case of 2MR, the 1st digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the 2nd digit is increased by one.
- ⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.

1MR (Example)
- When placing the order for 5 pieces of EPHB1MR2—150—P1.8—1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of EPHB1MR3—150—P2.8—Z, characters for engraving "Z A B"

2MR (Example)
- When placing the order for 4 pieces of EPHB2MR4—100—P3.8—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of EPHB2MR4—100—P3.8—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of EPHB2MR6—150—P5.8—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

■No. of characters and shaft diameter (P)

No. of characters	P
1M・1MR (1 character)	0.40~11.99
2M・2MR (2 characters)	1.50~11.99
3M (3 characters)	2.80~11.99
4M (4 characters)	3.60~11.99
5M (5 characters)	4.50~11.99

Order

Part Number				L		P		Characters for engraving (0~9, A~Z ／><+—⬚•.)
Type	Character	No.						
EPHB	3M	7	—	65.00	—	P6.80	—	923
EPHB	5M	8	—	125.00	—	P7.58	—	>#&%<

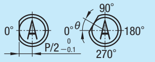
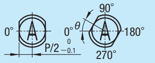
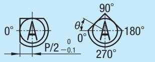
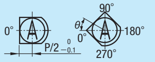
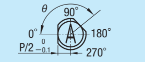
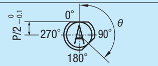
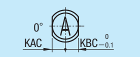
Days to Ship Quotation

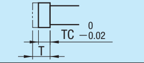
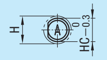
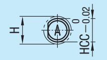
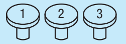
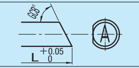
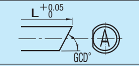
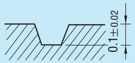
Alterations

Part Number — L — P — Characters for engraving — (AKC・AWC···etc.)
EPHB3M 7 — 65.00 — P6.80 — 923 — TC2

Quotation

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 When combined with GCB/GCD, 90° increments only No need to designate AKC0	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with GCB/GCD, 90° increments only	
	ARC	ARC=1° increments 0≦ARC<360 When combined with GCB/GCD, 90° increments only	
	ADC	ADC=1° increments 0≦ADC<360 When combined with GCB/GCD, 90° increments only	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 (Dimension L remains unchanged.) T−TC≦Lmax.−L	Quotation
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	GCB	GCB=1° increments 60≦GCB<90 L≦200, Available when P≧2 ⊗ Combination with GCD not available.	
	GCD	GCD=1° increments 60≦GCD<90 L≦200, Available when P≧2 ⊗ Combination with GCB not available.	
	EC	Engraving depth alteration 0.05···▸0.1 Available when P≧1 ⊗ Combination with GCB, GCD not available.	

P Price Quotation

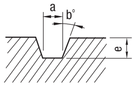
■Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1M 1MR (1 character)	0.40~ 0.49	0.25	0.13
	0.50~ 0.59	0.35	0.18
	0.60~ 0.79	0.4	0.2
	0.80~ 0.99	0.6	0.3
	1.00~ 1.29	0.8	0.4
	1.30~ 1.49	1.0	0.5
	1.50~ 1.99	1.2	0.6
	2.00~ 2.49	1.5	0.8
	2.50~ 3.49	2.0	1.0
	3.50~ 4.49	3.0	1.5
	4.50~ 5.49	4.0	2.0
	5.50~11.99	5.0	2.5

No. of characters	P	Q	W
2M 2MR (2 characters)	1.50~ 1.99	0.7	1.1
	2.00~ 2.29	0.8	1.2
	2.30~ 2.99	1.0	1.3
	3.00~ 3.99	1.5	2.0
	4.00~ 4.99	2.0	2.6
	5.00~ 5.99	2.5	3.3
	6.00~ 7.99	3.0	3.9
	8.00~11.99	4.0	5.2
3M (3 characters)	2.80~ 3.09	0.8	1.8
	3.10~ 4.49	1.0	2.1
	4.50~ 5.49	1.5	3.2
	5.50~ 6.99	2.0	4.2
	7.00~11.99	2.5	5.3
4M (4 characters)	3.60~ 3.89	0.8	2.4
	3.90~ 5.49	1.0	2.9
	5.50~ 6.99	1.5	4.4
	7.00~11.99	2.0	5.8
5M (5 characters)	4.50~ 4.99	0.8	3.0
	5.00~ 6.99	1.0	3.7
	7.00~11.99	1.5	5.6

Ejector pins	Finished products
Reversed reading (Concave character)	Right reading (Convex character)

Details of engraving

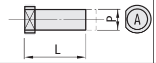


Width of engraving (a)	0.1×Q~0.2×Q
Angle of engraving (b°)	35° ±2°
Depth of engraving (e)	When P≦0.99 0.03±0.01 When P≧1.00 0.05±0.02 When EC code is used 0.1±0.02

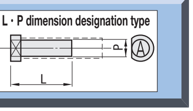
EXTRA PRECISION STRAIGHT EJECTOR PINS WITH ENGRAVING

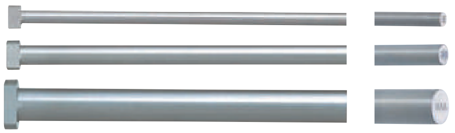
—L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION TYPE—

L dimension designation type



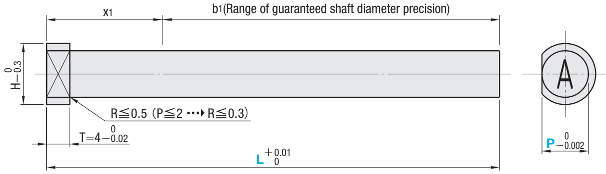
L・P dimension designation type





RoHS

Part Number Type	Character	Head thickness	T P
EPV EPVB	□M □MR (Sequential numbering designation)	4mm(T4)	0 −0.002



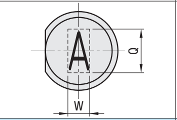
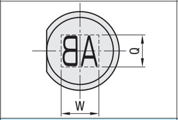
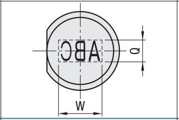
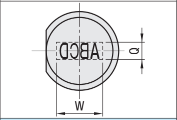
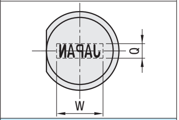
Range of guaranteed shaft diameter precision
(Details ☞ **P.1301**)

P	x1 max.
1.000～5.000	30

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness
(Details ☞ **P.1303**)
Applied with overall quenching
(its head without annealing).

❢ To determine the engraving position, key flat cutting is made at the standard 0°

❢ The heads of extra precision straight ejector pins are not annealed in order to guarantee precision. Use a construction that supports sliding and does not readily apply a load to the flange of the ejector pin, such as by using a precision ejector guide pin & bushing.

1M・1MR (1 character)	**2M・2MR** (2 characters)	**3M** (3 characters)	**4M** (4 characters)	**5M** (5 characters)
				
1.000≦P≦5.000	2.000≦P≦5.000	2.800≦P≦5.000	3.600≦P≦5.000	4.500≦P≦5.000

❢ Designate characters in the right reading order to appear on the finished products. ❢ Refer to ☞ **P.118** for character font.

■ L dimension designation type

4mm head H	 T	Part Number Type	 Character	 P	L 0.01mm increments	Characters for engraving (Round Gothic type)
3	4	EPV	1M	1	50.00～100.00	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
			2M	1.5		
4			3M	2		
5			4M	2.5		
6			5M	3		
7				3.5	50.00～120.00	
			Sequential numbering designation	4		
8			※1MR	4.5		
			※2MR	5		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%
Centered dot	•	@
Period	.	&

❢ Use ¥ for indicating (slash), # for —(minus), % for ⬚(space), @ for • (centered dot), and & for . (period).

■ L・P dimension designation type

4mm head H	 T	Part Number Type	 Character	 No.	L 0.01mm increments	P 0.001mm increments	Characters for engraving (Round Gothic type)
3	4	EPVB	1M	1.5	50.00～100.00	1.000～1.499	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
4			2M	2		1.500～1.999	
5			3M	2.5		2.000～2.499	
6			4M	3		2.500～2.999	
7			5M	3.5	50.00～120.00	3.000～3.499	
			Sequential numbering designation	4		3.500～3.999	
8			※1MR	4.5		4.000～4.499	
			※2MR	5		4.500～4.999	

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%
Centered dot	•	@
Period	.	&

❢ Use ¥ for indicating (slash), # for —(minus), % for ⬚(space), @ for • (centered dot), and & for . (period).
❢ ※ 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
❢ ※ In case of 1MR,"0" is next to "9" while "A" is next to "Z". ⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.
❢ ※ In case of 2MR, the ones digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the tens digit is increased by one.
- When placing the order for 5 pieces of EPV1MR2—150—1, characters for engraving "1 2 3 4 5" • When placing the order for 3 pieces of EPVB1MR3—150—P2.8—Z, characters for engraving "Z A B"

❢ Non JIS material definition is listed on P.1351 - 1352

Order

Part Number Type	 Character	 No.		L		P		Characters for engraving (0～9, A～Z ／＞＜＋—⬚•.)
EPV	1M	1.5	—	75.00			—	A
EPVB	3M	5	—	100.00	—	P4.700	—	BCD

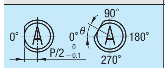
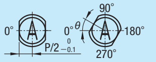
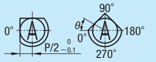
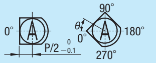
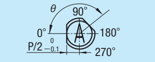
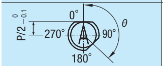
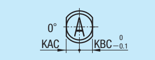
(L dimension designation type)
(L・P dimension designation type)

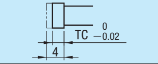
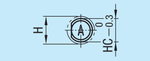
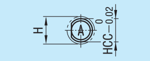
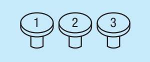
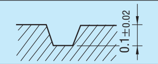
Days to Ship Quotation

Alterations

Part Number		L		P		Characters for engraving		(AKC・AWC···etc.)
EPVB3M5	—	100	—	P4.700	—	BCD	—	TC3.0

Alteration details ☞ **P.53**

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments ❢ 0＜AKC＜360 ❢ When combined with GCB/GCD, 90° increments only ❢ No need to designate AKC0	Quotation
	AWC	AWC=1° increments ❢ 0≦AWC＜360 ❢ When combined with GCB/GCD, 90° increments only	
	ARC	ARC=1° increments ❢ 0≦ARC＜360 ❢ When combined with GCB/GCD, 90° increments only	
	ADC	ADC=1° increments ❢ 0≦ADC＜360 ❢ When combined with GCB/GCD, 90° increments only	
	KGA	KGA=1° increments ❢ 0＜KGA＜360	
	KGB	KGB=1° increments ❢ 0＜KGB＜360	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2 ⊗ Combination with other key flat cutting not available	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments ❢ 2.0≦TC＜4, P≧1.5 (Dimension L remains unchanged.) ❢ 4—TC≦Lmax.—L	Quotation
	HC	HC=0.1mm increments ❢ P+1≦HC＜H, P≧1.5	
	HCC	HCC=0.1mm increments ❢ P+1≦HCC＜H—0.3, P≧1.5	
	NHC	Numbering on the head How to order ☞ **P.54**	
	NHN	Automatic sequential numbering on the head How to order ☞ **P.54**	
	EC	Engraving depth alteration 0.05 ···▸ 0.1 ❢ Available when P≧1 ⊗ Combination with GCB, GCD not available.	

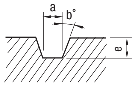
■ Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1M 1MR (1 character)	1.000～1.299	0.8	0.4
	1.300～1.499	1.0	0.5
	1.500～1.999	1.2	0.6
	2.000～2.499	1.5	0.8
	2.500～3.499	2.0	1.0
	3.500～4.499	3.0	1.5
	4.500～5.000	4.0	2.0
2M 2MR (2 characters)	2.000～2.299	0.8	1.2
	2.300～2.999	1.0	1.3
	3.000～3.999	1.5	2.0
	4.000～4.999	2.0	2.6
	5.000	2.5	3.3

No. of characters	P	Q	W
3M (3 characters)	2.800～3.099	0.8	1.8
	3.100～4.499	1.0	2.1
	4.500～5.000	1.5	3.2
4M (4 characters)	3.600～3.899	0.8	2.4
	3.900～5.000	1.0	2.9
5M (5 characters)	4.500～4.999	0.8	3.0
	5.000	1.0	3.7

Ejector pins	Finished products
Reversed reading (Concave character)	Right reading (Convex character)

Details of engraving



Width of engraving (a)	(0.1×Q)±0.05
Angle of engraving (b°)	30° ±2°
Depth of engraving (e)	0.05±0.02 When EC code is used 0.1±0.02

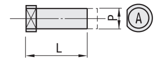
Price Quotation

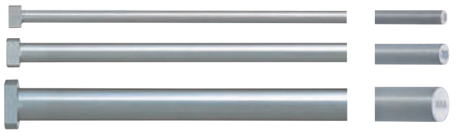
Dies Steel
SKD61 equivalent
+
Nitriding

STRAIGHT EJECTOR PINS WITH ENGRAVING

—L DIMENSION DESIGNATION TYPE—

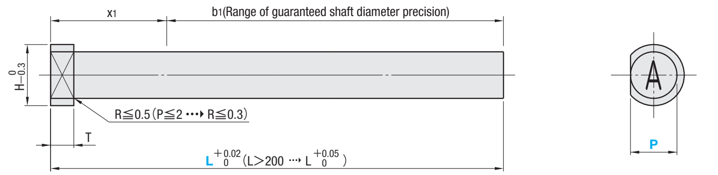
L dimension designation type





RoHS

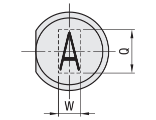
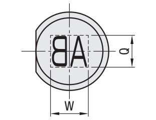
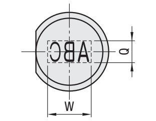
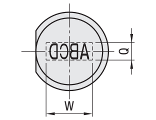
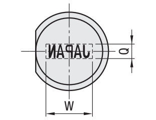
Part Number	Head thickness	T T	T P 1~13	T P 15~20	T P 25
EPN□M EPN□MR	4mm(T4)	0 −0.02	−0.01 −0.02	−0.01 −0.03	−0.01 −0.04
EPJ□M EPJ□MR	6・8mm(JIS)	0 −0.05			


x1
b1(Range of guaranteed shaft diameter precision)
H −0.3 0
R≦0.5(P≦2 ···› R≦0.3)
T
L +0.02 0 (L>200 ··· L +0.05 0)
A
P

To determine the engraving position, key flat cutting is made at the standard 0°

Range of guaranteed shaft diameter precision (Details P.1301)
T4 ···› x1 max.30
JIS ···› x1 max.35

M SKD61 equivalent+Nitrided
H Surface:900HV~ Base material:40~45HRC
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
				
1≦P≦25	1.5≦P≦25	2.8≦P≦25	3.6≦P≦25	4.5≦P≦25

Designate characters in the right reading order to appear on the finished products. Refer to P.118 for character font.

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Part Number Character	Part Number P	0.01mm increments L	Characters for engraving (Round Gothic type)
3	4	—	—	EPN	—	1M 2M 3M 4M 5M Sequential numbering designation 1MR 2MR	1 1.1 1.2 1.3 1.4	40.00~150.00	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
							1.5	40.00~200.00	
4							1.6 1.7 1.8 1.9		
							2	40.00~300.00	
5							2.1 2.2 2.3 2.4		
							2.5		
6							2.6 2.7 2.8 2.9		
							3		
7							3.1 3.2 3.3 3.4		
							3.5		
							3.6 3.7 3.8 3.9		
							4		
8		8	6		EPJ		(4.1) (4.2) (4.3) (4.4)		
							4.5		
		9					(4.6) (4.7) (4.8) (4.9)		
							5		
9							(5.1) (5.2) (5.3) (5.4)		
							5.5		
		10					(5.6) (5.7) (5.8) (5.9)		
							6		
10		11					(6.1) (6.2) (6.3) (6.4)		
							6.5		
							7		
11		13	8				8		
15		15					10		
17		17					12		
18		18					(13)		
20		20					15		
21		21					16		
—	—	25		—			20		
		30					25		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%
Centered dot	•	@
Period	.	&

- The P dimension enclosed in brackets ( ) is applicable only for EPN.
- Use ¥ for indicating (slash), # for —(minus), % for ⬚(space), @ for • (centered dot), and & for . (period).
- 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
- In case of 1MR,"0" is next to "9" while "A" is next to "Z".
- In case of 2MR, the 1st digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the 2nd digit is increased by one.
- ⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.

1MR (Example) • When placing the order for 5 pieces of EPN1MR2—150—1, characters for engraving "1 2 3 4 5"
• When placing the order for 3 pieces of EPN1MR3—150—Z, characters for engraving "Z A B"
2MR(Example) • When placing the order for 4 pieces of EPJ2MR4—100—01, characters for engraving "01 02 03 04"
• When placing the order for 4 pieces of EPJ2MR4—100—A8, characters for engraving "A8 A9 B0 B1"
• When placing the order for 6 pieces of EPJ2MR6—150—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

Non JIS material definition is listed on P.1351 - 1352

Order

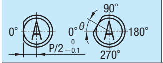
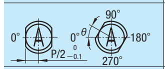
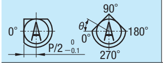
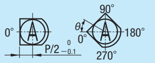
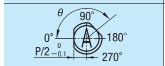
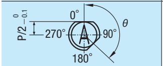
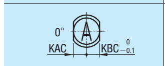
Part Number Type	Part Number Character	Part Number P		L		Characters for engraving (0~9, A~Z ／＞＜＋—⬚•.)
EPN	2M	6	—	250.00	—	A1
EPJ	1MR	5	—	280.00	—	T

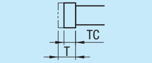
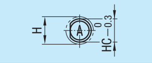
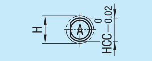
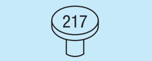
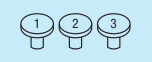
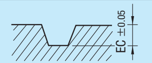
Days to Ship Quotation

Alterations

Part Number		L		Characters for engraving		(AKC・AWC···etc.)
EPJ1M 4	—	270.00	—	A	—	AKC90

Alteration details P.53

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 (Dimension L remains unchanged.) T—TC≦Lmax.—L	Quotation
	HC	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	HCC	HCC=0.1mm increments P+1≦HCC<H—0.3, P≧1.5	
	NHC	Numbering on the head How to order P.54	
	NHN	Automatic sequential numbering on the head How to order P.54	
	EC	Engraving depth alteration 0.2 ···› 0.1 Designation method EC0.1 0.2 ···› 0.3 Designation method EC0.3	

Price Quotation

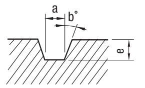
■Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1M 1MR (1 character)	1 ~1.2	0.8	0.4
	1.3~1.4	1.0	0.5
	1.5~1.9	1.2	0.6
	2 ~2.4	1.5	0.8
	2.5~3.4	2.0	1.0
	3.5~4.4	3.0	1.5
	4.5~5.4	4.0	2.0
	5.5~12	5.0	2.5
	13 ~20	9.0	4.5
	25	14.0	7.0
2M 2MR (2 characters)	1.5~1.9	0.7	1.1
	2 ~2.2	0.8	1.2
	2.3~2.9	1.0	1.3
	3 ~3.9	1.5	2.0
	4 ~4.9	2.0	2.6
	5 ~5.9	2.5	3.3
	6 ~ 7	3.0	3.9
	8 ~12	4.0	5.2
	13~20	6.5	8.0
	25	10.0	12.5

No. of characters	P	Q	W
3M (3 characters)	2.8~ 3	0.8	1.8
	3.1~4.4	1.0	2.1
	4.5~5.4	1.5	3.2
	5.5~6.5	2.0	4.2
	7 ~12	2.5	5.3
	13~20	4.5	8.5
	25	7.0	13.5
4M (4 characters)	3.6~3.8	0.8	2.4
	3.9~5.4	1.0	2.9
	5.5~6.5	1.5	4.4
	7 ~12	2.0	5.8
	13~20	3.5	8.8
	25	5.5	14.0
5M (5 characters)	4.5~4.9	0.8	3.0
	5 ~6.5	1.0	3.7
	7 ~12	1.5	5.6
	13~20	3.0	9.0
	25	4.8	14.2

Ejector pins	Finished products
Reversed reading (Concave character)	Right reading (Concave character)

Details of engraving

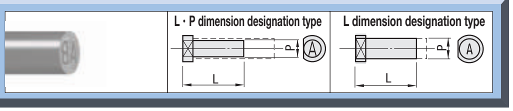


Width of engraving (a)	0.1×Q~0.2×Q
Angle of engraving (b°)	20° ±2°
Depth of engraving (e)	0.2±0.05

High Speed Steel
SKH51 equivalent
4mm head

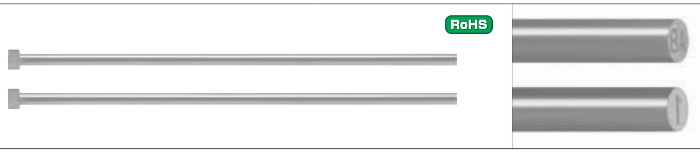
STRAIGHT EJECTOR PINS WITH ENGRAVING

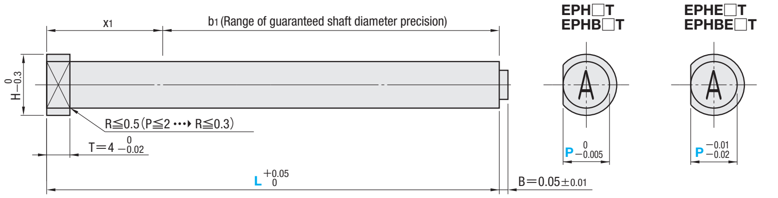
—L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION・CONVEX CHARACTER TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS



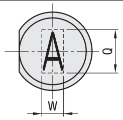
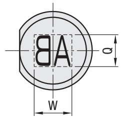


Part Number	Head thickness	T P
EPH□T **EPHB□T**	4mm(T4)	$^{0}_{-0.005}$
EPHE□T **EPHBE□T**		$^{-0.01}_{-0.02}$

To determine the engraving position, key flat cutting is made at the standard 0°

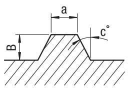
Range of guaranteed shaft diameter precision (Details P.1301)
T4 ···▸ x1 max.30

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

1T (1character)	**2T** (2 characters)
	
1≦P≦4	2≦P≦4

Designate characters in the right reading order to appear on the finished products.

Details of engraving



Ejector pins	Finished products
Reversed reading (Convex character)	Normal reading (Concave character)

Width of engraving (a)	0.1×Q～0.2×Q
Angle of engraving (c°)	25°±2°
Depth of engraving (B)	0.05±0.01

■L dimension designation type

H	T	Part Number			L	Characters for engraving
		Type	Character	P	0.01mm increments	(Round Gothic type)
3	4	**EPH** (P $^{0}_{-0.005}$) **EPHE** (P $^{-0.01}_{-0.02}$)	**1T** **2T** (P≧2)	1 1.1 1.2 1.3 1.4	40.00～200.00	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
3				1.5	40.00～250.00	
4				1.6	40.00～250.00	
4				1.7 1.8 1.9	40.00～200.00	
4				2	40.00～250.00	
5				2.1	40.00～250.00	
5				2.2 2.3 2.4	40.00～200.00	
5				2.5	40.00～250.00	
6				2.6	40.00～250.00	
6				2.7 2.8 2.9	40.00～200.00	
6				3	40.00～250.00	
7				3.1	40.00～250.00	
7				3.2 3.3 3.4	40.00～200.00	
7				3.5 3.6	40.00～250.00	
7				3.7 3.8 3.9	40.00～200.00	
7				4	40.00～250.00	

■L・P dimension designation type

H	T	Part Number			0.01mm increments		Characters for engraving
		Type	Character	No.	L	P	(Round Gothic type)
3	4	**EPHB** (P $^{0}_{-0.005}$) **EPHBE** (P $^{-0.01}_{-0.02}$)	**1T** **2T** (P≧2)	1.5	40.00～200.00	1.00～1.49	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
4				2	40.00～250.00	1.50～1.99	
5				2.5		2.00～2.49	
6				3		2.50～2.99	
7				3.5		3.00～3.49	
				4		3.50～3.99	

Order

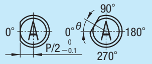
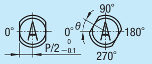
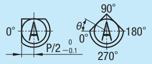
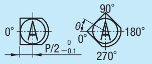
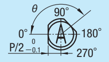
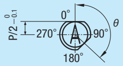
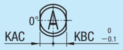
Part Number				L		Characters for engraving
Type	Character	P	—		—	(0～9 A～Z)
EPH	1T	4	—	200.00	—	A

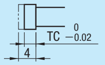
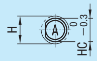
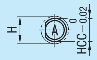
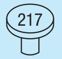
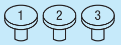
Days to Ship **Quotation**

Alterations

Part Number	—	L	—	Characters for engraving (0～9, A～Z)	—	(AKC・AWC···etc.)
EPH1T 4	—	200.00	—	A	—	AKC120

Alteration details P.53

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	**AWC**	AWC=1° increments 0≦AWC<360	
	**ARC**	ARC=1° increments 0≦ARC<360	
	**ADC**	ADC=1° increments 0≦ADC<360	
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGB**	KGB=1° increments 0<KGB<360	
	**KAC** **KBC**	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments 2.0≦TC<4,P≧1.5 (Dimension L remains unchanged) 4−TC≦Lmax.−L	Quotation
	**HC**	HC=0.1mm increments P+1≦HC<H, P≧1.5	
	**HCC**	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	**NHC**	Numbering on the head How to order P.54	
	**NHN**	Automatic sequential numbering on the head How to order P.54	

■Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1T (1 character)	1.0～1.29	0.6	0.5
	1.3～1.49	0.6	0.5
	1.5～1.99	0.9	0.7
	2.0～2.49	1.3	0.8
	2.5～2.99	1.6	1.0
	3.0～3.49	1.9	1.2
	3.5～4	2.3	1.4
2T (2 characters)	2.0～2.49	1.0	1.4
	2.5～2.99	1.2	1.7
	3.0～3.49	1.5	2.1
	3.5～3.99	1.7	2.4
	4	2	2.8

■Character font (Round Gothic type)

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z

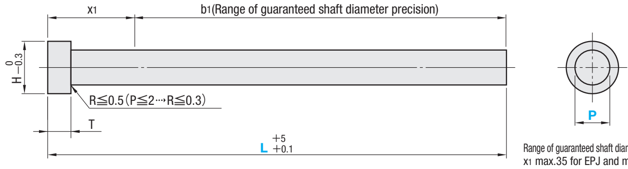
Price **Quotation**

STRAIGHT EJECTOR PINS

—PACKAGE PRODUCTS—

RoHS

PACK	Type	M	H	Head thickness	T T	T P
50PACK (50) 100PACK (100)	EPH	SKH51 equivalent	58～60HRC	4mm(T4)	$^{0}_{-0.02}$	$^{0}_{-0.005}$
	EPHE					$^{-0.01}_{-0.02}$
	EPN	SKD61 equivalent + Nitriding	Surface 900HV～ Base material 40～45HRC			
	EPJ			6・8mm(JIS)	$^{0}_{-0.05}$	
	EPD	SKD61 equivalent	50～55HRC	4mm(T4)	$^{0}_{-0.02}$	



Range of guaranteed shaft diameter precision (Details P.1301)
x_1 max.35 for EPJ and max.30 for other than EPJ
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

■SKH51 equivalent(58～60HRC)

H	T	Part Number			L	50 PACK PRICE			100 PACK PRICE		
		PACK	Type	P	Selection	L100	L150	L200	L100	L150	L200
3	4	50 PACK 100 PACK	EPH EPHE	1	100 150 200	Quotation					
				1.5	100 150 200						
4				2	100 150 200						
5				2.5	100 150 200						
6				3	100 150 200						
7				4	100 150 200						

■SKD61 equivalent＋Nitriding (Base material 40～45HRC, Surface 900HV～)　4mm head

H	T	Part Number			L	50 PACK PRICE				100 PACK PRICE			
		PACK	Type	P	Selection	L100	L150	L200	L300	L100	L150	L200	L300
3	4	50 PACK 100 PACK	EPN	1.5	100 150 200	Quotation							
4				2	100 150 200								
6				3	100 150 200								
7				4	100 150 200								
8				5	100 150 200								
9				6	150 200 300								

■SKD61 equivalent＋Nitriding (Base material 40～45HRC, Surface 900HV～)　JIS head

H	T	Part Number			L	50 PACK PRICE				100 PACK PRICE			
		PACK	Type	P	Selection	L150	L200	L250	L300	L150	L200	L250	L300
8	6	50 PACK 100 PACK	EPJ	4	150 200 250 300	Quotation							
9				5	150 200 250 300								
10				6	150 200 250 300								
13	8			8	150 200 250 300								

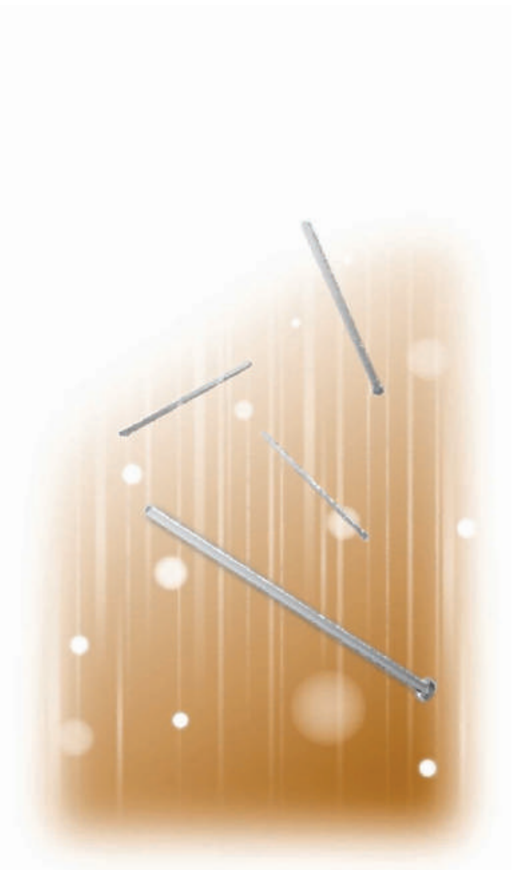
■SKD61 equivalent(50～55HRC)

H	T	Part Number			L	50 PACK PRICE			100 PACK PRICE		
		PACK	Type	P	Selection	L100	L150	L200	L100	L150	L200
4	4	50 PACK 100 PACK	EPD	2	100 150 200	Quotation					
6				3	100 150 200						
7				4	100 150 200						

Order

Part Number			—	L
PACK	Type	P		
(50) 50 PACK	EPH	3	—	100
(100) 100 PACK	EPHE	3	—	100

Days to Ship　Quotation



Dies Steel
SKD61 equivalent
+
Nitriding

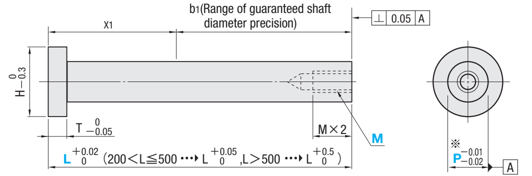
PINS FOR EJECTOR BLOCK

Non JIS material definition is listed on P.1351 - 1352

RoHS

Close-up of tip end

EBPJ


b1(Range of guaranteed shaft diameter precision)
X1
⊥ 0.05 A
$H^{0}_{-0.3}$
$T^{0}_{-0.05}$
M×2
M
$L^{+0.02}_{0}$ (200<L≦500 ···▸ $L^{+0.05}_{0}$, L>500 ···▸ $L^{+0.5}_{0}$)
※
$P^{-0.01}_{-0.02}$
A

※When P>12, $^{-0.01}_{-0.03}$.

Range of guaranteed shaft diameter precision (Details P.1301)
x1 max.35

M SKD61 equivalent+Nitrided
H Surface base:900HV~
Base material:40±3HRC
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

H	T	Part Number Type	Part Number P	L 0.01mm increments (L>500 → 0.1mm increments)	M
10	6	EBPJ	6	40.00~450.00	3 4 5 6 8 10 12 16 M≦P−3
11			7		
13	8		8	40.00~500.00	
15			10		
17			12	40.00~800.00	
21			16		
25			20		

Order

Part Number	—	L	—	M
EBPJ8	—	220.00	—	M4

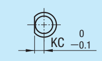
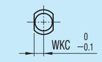
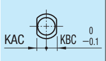
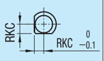
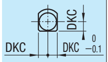
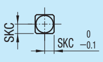
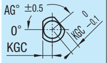
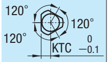
Days to Ship Quotation

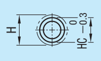
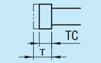
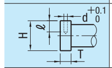
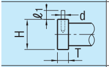
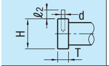
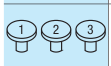
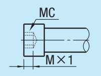
Price Quotation

Alterations

Part Number	—	L	—	M	—	(KC・WKC···etc.)
EBPJ8	—	225.55	—	M4	—	WKC4

Alteration details P.53

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKCa<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

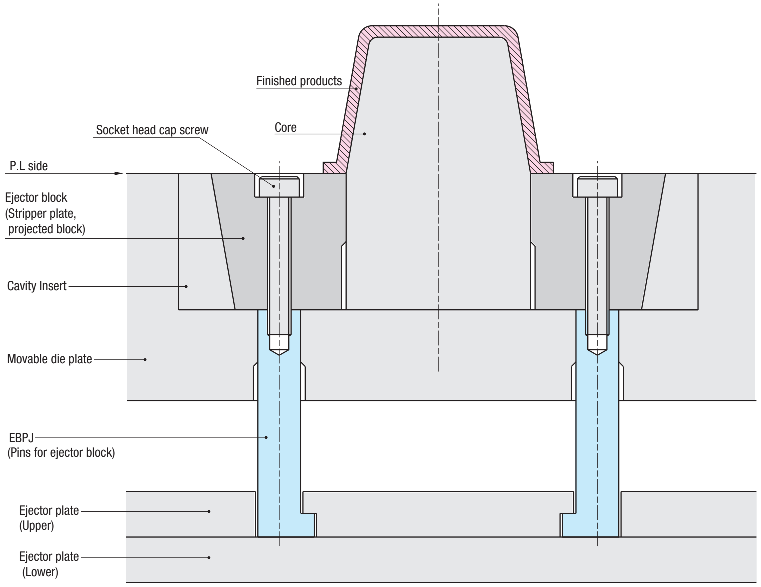
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H	Quotation
	TC	TC=0.1mm increments T/2≦TC<T (Dimension L remains unchanged) T−TC≦Lmax.−L	
	NC	Dowel hole boring ⊗ Combination with other than NHC・NHN not available. T: 6, 8 / d: 3 / ℓ: 5	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN not available. T: 6, 8 / d: 3 / ℓ1: 5	
	NCS	Dowel hole boring+Dowel pin driving ⊗ Combination with other than NHC・NHN not available. T: 6, 8 / d: 3 / ℓ2: 5	
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC・MC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC・MC not available.	
	MC	Head tapping Available when P≧8 ⊗ Combination with any other alteration not available. P 8: M4 / 10: M5 / 12: M6 / 16・20: M8	

Example

■Characteristics

- The assembly and adjustment of ejector block (stripper plate) ejected mold is easy.
- The ejector blocks can be installed from the parting line by using socket head cap screws.
- The rotation during bolt tightening can be prevented by combination with key flat cutting alteration (KC, etc.).
- They are used by customers of food containers, medical apparatuses, cylindrical molded products, automotive interior decoration products and home appliances, etc.

●Example of use on cylindrical containers

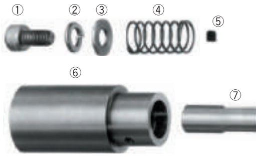

Finished products
Socket head cap screw
Core
P.L side
Ejector block
(Stripper plate,
projected block)
Cavity Insert
Movable die plate
EBPJ
(Pins for ejector block)
Ejector plate
(Upper)
Ejector plate
(Lower)

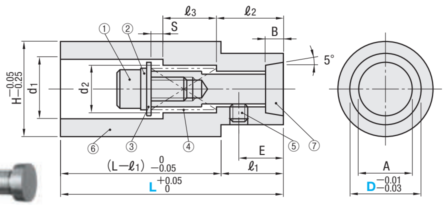
Straight Ejector Pins

Dies Steel
SKD61 equivalent
+
Nitriding

RoHS

AJVE (Steel type)
AJV (Stainless Steel type)





No.	Item	AJVE M	AJVE H	AJV M	AJV H
①	Socket head cap screw	SCM435	38～43HRC	SUS304	—
②	Spring Washers	SWRH62	42～50HRC	SUS304	—
③	Plain washer	SK5	—	SUS304	—
④	SPRINGS	SUS304	—	SUS304	—
⑤	Screw plug	SCM435	34～43HRC	SCM435	34～43HRC
⑥	Cylinder tube	S45C	33～38HRC	NAK101	35HRC
⑦	Piston rod	S45C	33～38HRC	NAK101	35HRC

D	Ejection force N{kgf}	Spring pressure N{kgf}	Components ①	Components ⑤
10	9.61{ 0.98}	4.81{0.49}	M 3—L 6	MSW3
13	16.67{ 1.70}	8.34{0.85}	M 4—L 8	MSW3
16	24.51{ 2.50}	12.26{1.25}	M 5—L10	MSW4
20	38.25{ 3.90}	19.61{2.00}	M 6—L12	MSW4
25	64.72{ 6.60}	32.36{3.30}	M 8—L15	MSW5
32	124.54{12.70}	63.74{6.50}	M10—L20	MSW6

{kgf}=N×0.101972

- The screw plug ⑤ is used to fix the piston rod ⑦ when assembling/disassembling the air-jet valve. Before mounting the air-jet valve on a mold, make sure to loosen the screw plug and check the piston rod movement.
- Periodically tighten the bolt ① in order to prevent the piston rod ⑦ from coming loose.
- Shown here are reference values of ejection force when the air pressure is 49N/cm²{500kPa}.
- When using the air-jet value, set the air pressure at 49N/cm²{500kPa} or higher.

S	E	ℓ1	ℓ2	ℓ3	d1	d2	H	B	A	Part Number Type	Part Number D	L AJVE (Selection)	L AJV 1mm increments
1.5	7	12	10.5	8.5	8.5	6.5	15	3	7.5	**AJVE** (Steel type) **AJV** (Stainless type)	10	20 25 30 35	19～35
1.5	8	15	14	11	10.5	8.5	18	4	9		13	25 30 35 40	25～40
2.5	10	15	16	12	12.5	10.5	21	4	11		16	30 40 50	28～50
3.0	12	20	21	15	16	13	25	6	14		20	40 50 60	36～60
3.0	12	20	26	18	19	16	32	6	18		25	50 60 70	44～70
5.0	15	25	35	20	25	22	40	8	25		32	70 80	55～80

Please select AJV (stainless type) for resin with high liquidity when you select the material, and select AJVE (steel type) for resin with low liquidity.

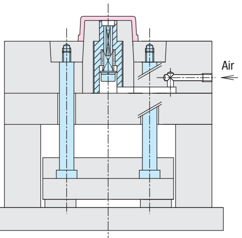
Order

Part Number	—	L
AJVE 20	—	60
AJV 20	—	38

Price Quotation

Example

- Thrust out the molded product using air pressure.
- Use these valves for thrusting out deep-molded products, when problems are likely to occur if the marks of the ejector pin remain on the product, and so on.

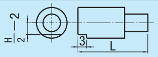
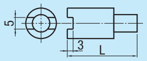
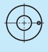
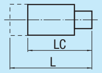


Days to Ship Quotation

Alterations

Part Number — L(LC) — (KC · JC · AC)
AJVE 20 — LC58 — KC

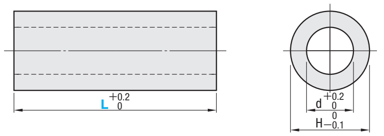
Quotation

Alterations	Code	Spec.	1Code
	KC	 H/2—2 3 L ⑥Adds a key flat on the cylinder tube.	Quotation
	JC	 5 3 L ⑥Adds a spacer connecting slot onto the cylinder tube.	
	AC	 Enables the user to keep air blowing all the time. ③Adds a hole on the plain washer.	
 LC L	LC	⑥Total length alteration 1mm increments Lmin.≦LC<L Available for AJVE only. D 10 13 16 20 25 32 Lmin. 19 25 28 36 44 55	

Non JIS material definition is listed on P.1351 - 1352

RoHS

AJVS (Spacers for Air-jet Valve)

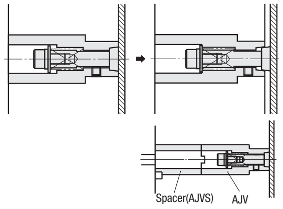


M S45C

d	H	Part Number Type	Part Number No.	L 1mm increments	U/Price 1～9 L10～50	U/Price 1～9 L51～100
8.5	15	AJVS	10	10～100	Quotation	
10.5	18		13			
10.5	21		16			
13	25		20			
16	32		25			
25	40		32			

Example

● By making a unit with the air-jet valve, you can avoid major machining work; no more than a simple boring process on the mold plane will be required.



Opening the valve with air allows:
1. Vacuum breaking
2. Air blowing
3. Preliminary ejection

Order

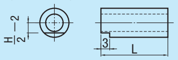
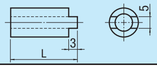
Part Number	—	L
AJVS 10	—	53

Days to Ship Quotation

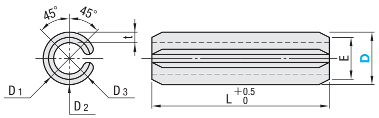
Price Quotation

Alterations

Part Number — L — (KC · JC)
AJVS 16 — 85 — KC

Alterations	Code	Spec.	1Code
	KC	Adds a key flat on the spacer.  H/2—2 3 L	Quotation
	JC	Adds a cylinder tube on the spacer connecting slot.  L 3 5	

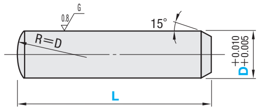
WSP (Spring Pins chamfered both ends (W type))



M SUS 402 J2

RoHS

MS (Dowel pin)



M SUJ2
H 58HRC～

Emax.	*kN{kgf}	t (Reference)	L	D min.	D max.	Part Number Type	Part Number D	U/Price 1～299	Slide unit price 300～499	Slide unit price 500～1999	Slide unit price 2000～4000
1.9	2.76{ 281}	0.4	8	2.15	2.25	WSP	2	Quotation			
2.9	6.20{ 633}	0.6	10	3.15	3.25		3				
3.9	10.80{1130}	0.8	10	4.2	4.4		4				

The maximum value of D is the maximum value on the pin's circumference; its minimum value is the average of D_1, D_2 and D_3.
Reference Value t is in accordance with JSMA No.6 (Standards of Japan Spring Manufacturers Association)
*The minimum load of double shearing (JIS B2808)

The detailed specifications of dowel pins ☞ P.1203

Order

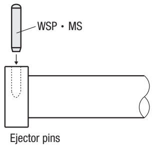
Part Number	—	L
WSP 2		
MS 3	—	15

Days to Ship Quotation

· **Recommended spring pins & dowel pins**

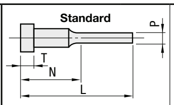
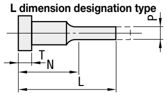
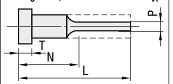
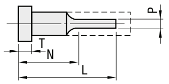
Head thickness of ejector pins in NC alteration	4mm	6 · 8mm	10mm
Spring pin (WSP)	WSP2	WSP3	WSP4
Dowel pin (MS)	MS2	MS3	MS4

Example



STEPPED EJECTOR PINS

STEPPED EJECTOR PINS

Category \ Type			Standard 		L dimension designation type 		N designation, L dimension selection type 		L・P・N dimension designation type 	
Material	**Head Thickness (T)**	**Tip diameter (P) tolerance**	**Part Number**	**Page**	**Part Number**	**Page**	**Part Number**	**Page**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.002	—		**EVSL**	P.137	**EVSG**	P.137	**EVSF**	P.137
		0 −0.005	**EHS**	P.129	**EHSL**	P.131	**EHSG**	P.133	**EHSF**	P.135
		−0.01 −0.02	**EHSE**	P.129	**EHSEL**	P.131	**EHSEG**	P.133	**EHSFE**	P.135
	4mm (T4) Small diameter	0 −0.005	—		—		—		**EHYF**	P.135
	6・8mm (JIS)	0 −0.005	**EHSJ**	P.129	**EHSJL**	P.131	**EHSJG**	P.133	**EHSJF**	P.135
		−0.01 −0.02	**EHSJE**	P.129	**EHSJEL**	P.131	**EHSJEG**	P.133	**EHSJFE**	P.135
SKH51 equivalent + Hard chromate plating	4mm (T4)	0 −0.005	—		—		—		**C−EHSF**	P.139
		−0.01 −0.02	—		—		—		**C−EHSFE**	P.139
	4mm (T4) Small diameter	0 −0.005	—		—		—		**C−EHYF**	P.139
	6・8mm (JIS)	0 −0.005	—		—		—		**C−EHSJF**	P.139
		−0.01 −0.02	—		—		—		**C−EHSJFE**	P.139
SKD61 equivalent	4mm (T4)	0 −0.005	**EDS**	P.153	**EDSL**	P.155	**EDSG**	P.153	**EDSFS**	P.155
		−0.01 −0.02	**EDSE**	P.153	**EDSEL**	P.155	**EDSEG**	P.153	**EDSF**	P.155
SKD61 equivalent + Nitriding	4mm (T4) 6・8mm (JIS)	* Reference tolerance −0.01 −0.02	**ENS**	P.149	**ENSL**	P.151	**ENSG**	P.149	**ENSF**	P.151
			EJS	P.149	**EJSL**	P.151	**EJSG**	P.149	**EJSF**	P.151
SKD61 equivalent Prehardened	4mm (T4) 6・8mm (JIS)	* Reference tolerance −0.01 −0.02	—		—		**EASG**	P.157	**EASF**	P.157
			—		—		—		**EAJSF**	P.157
SUS440C	4mm (T4)	0 −0.005	—		—		—		**EWSF**	P.159
	6mm (JIS)	0 −0.005	—		—		—		**EWSJF**	P.159

*The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the tip diameter. For details, refer to the catalog page of each product.

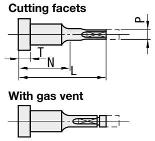
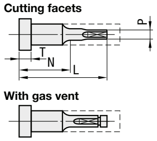
STEPPED EJECTOR PINS WITH GAS VENT

・Cutting facets

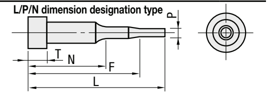
Close-up of tip end

・With gas vent

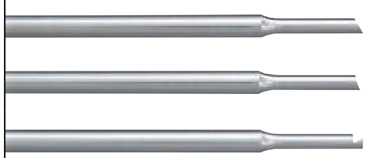
Close-up of tip end

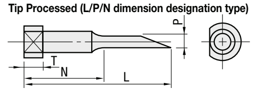
Category \ Type				L dimension designation type Cutting facets With gas vent 		L・P・N dimension designation type Cutting facets With gas vent 	
Tip	**Material**	**Head Thickness (T)**	**Shaft diameter (P) Tolerance**	**Part Number**	**Page**	**Part Number**	**Page**
Single flat cutting	SKH51 equivalent	4mm (T4)	0 −0.005	**GW−EHSL**	P.145	**GW−EHSF**	P.147
			−0.01 −0.02	**GW−EHSEL**	P.145	**GW−EHSFE**	P.147
		6・8mm (JIS)	0 −0.005	**GW−EHSJL**	P.145	**GW−EHSJF**	P.147
			−0.01 −0.02	**GW−EHSJEL**	P.145	**GW−EHSJFE**	P.147
Four flats cutting	SKH51 equivalent	4mm (T4)	0 −0.005	**GWS−EHSL**	P.145	**GWS−EHSF**	P.147
			−0.01 −0.02	**GWS−EHSEL**	P.145	**GWS−EHSFE**	P.147
		6・8mm (JIS)	0 −0.005	**GWS−EHSJL**	P.145	**GWS−EHSJF**	P.147
			−0.01 −0.02	**GWS−EHSJEL**	P.145	**GWS−EHSJFE**	P.147
With gas vent	SKH51 equivalent	4mm (T4)	0 −0.005	**GVB−EHSL**	P.141	**GVB−EHSF**	P.143
			−0.01 −0.02	**GVB−EHSEL**	P.141	**GVB−EHSFE**	P.143
		6・8mm (JIS)	0 −0.005	**GVB−EHSJL**	P.141	**GVB−EHSJF**	P.143
			−0.01 −0.02	**GVB−EHSJEL**	P.141	**GVB−EHSJFE**	P.143

TWO-STEPPED EJECTOR PINS

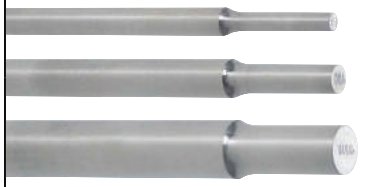
Category \ Type			L/P/N dimension designation type 	
Material	**Head Thickness (T)**	**Tip diameter (P) tolerance**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.005	**EHWSB**	P.161

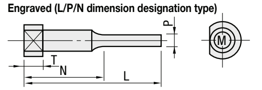
STEPPED EJECTOR PINS WITH TIP PROCESS



Category \ Type			Tip Processed (L/P/N dimension designation type) 	
Material	**Head Thickness (T)**	**Tip diameter (P) tolerance**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.005	**EHSF□A**	P.167
		−0.01 −0.02	**EHSFE□A**	P.167
	6・8mm (JIS)	0 −0.005	**EHSJF□A**	P.167
		−0.01 −0.02	**EHSJFE□A**	P.167

STEPPED EJECTOR PINS WITH ENGRAVING



Category \ Type			Engraved (L/P/N dimension designation type) 	
Material	**Head Thickness (T)**	**Tip diameter (P) tolerance**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.005	**EHSF□M・EHSF□MR**(Sequential No.)	P.169
		−0.01 −0.02	**EHSFE□M・EHSFE□MR**(Sequential No.)	P.169
	6・8mm (JIS)	0 −0.005	**EHSJF□M・EHSJF□MR**(Sequential No.)	P.169
		−0.01 −0.02	**EHSJFE□M・EHSJFE□MR**(Sequential No.)	P.169
SKD61 equivalent + Nitriding	6・8mm (JIS)	−0.01 −0.02	**EJSF□M・EJSF□MR**(Sequential No.)	P.171

■Material characteristics of ejector pins

	M		**High Speed Steel SKH51 (M2) (1.3343)**	**Dies Steel SKD61 (H13) (1.2344)**	**Dies Steel SKD61 (H13)(1.2344) + Nitriding**	**Prehardened Dies Steel SKD61 (H13)(1.2344)**	**Stainless steel SUS440C (S44004)(1.4125)**
	H	**HRC**	**58～60**	**50～55**	Surface base:**900HV～** **Material:40～45**	**40～45**	**56～60**
Machining characteristics	**Wear resistance**		5	4	4	3	4
	Ability to be mirror-finished		4	4	3	3	4
	Toughness		3	5	4	4	3
	Corrosion resistance		3	3	3	3	5
Physical characteristics	**Density**	[g/cm³]	8.2	7.75	7.75	7.75	7.78
	Modulus of longitudinal elasticity	[kgf/mm²]	22300	21000	21000	21000	20400
	Coefficient of thermal expansion	[×10⁻⁶/℃]	10.1	10.8	10.8	10.8	10.2
	Thermal conductivity	[cal/cm・sec・℃]	0.051	0.061	0.061	0.061	0.058
Mechanical characteristics	**Tensile strength**	[kgf/mm²]	235	135	135	135	200
	Charpy impact values	[kgf・m/cm²]	2	6	4	4	1.5

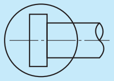
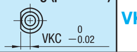
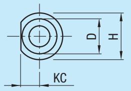
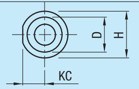
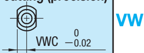
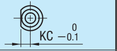
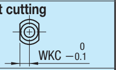
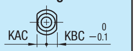
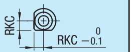
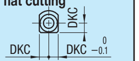
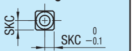
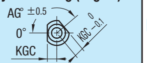
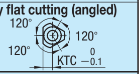
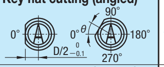
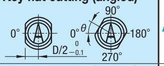
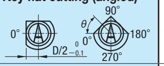
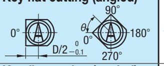
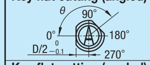
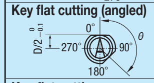
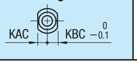
Machining characteristics 1 (Inferior) 3 (Good) 5 (Excellent)

Conversion expression
$1kgf/mm^2 = 9.81N/mm^2$
1cal/cm・sec・℃＝418.6W/M.K
$1kgf・m/cm^2 = 9.81J/cm^2$

Data (figures shown) may vary depending on heat treatment and/or working conditions: Use these data as reference.

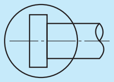
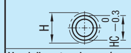
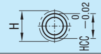
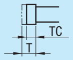
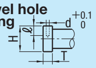
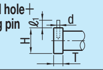
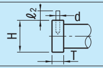
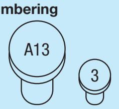
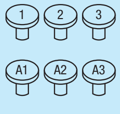
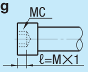
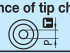
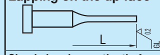
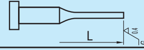
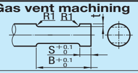
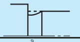
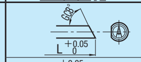
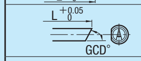
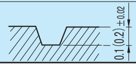
ALTERATION GUIDE FOR STEPPED EJECTOR PINS

■Alteration Guide for Stepped Ejector Pins

Items	Applicable Products	Alterations	Codes	Specifications		1Code
 **Head alteration**	**Stepped Ejector Pins** * Excluding products with head process and engraving.	**Key flat cutting (precision)** 	**VKC**	Single flat cutting (precision) ❗ High speed steel SKH51 equivalent only Range of designation D/2≦VKC<H/2	To make a flat at the shaft diameter position  Unit of designation Designation method 0.05mm increments possible • VKC3 (When D6) • VWC3.5 (When D7) • KC0.75 (When D1.5) • WKC3.5 (When D7) • KAC1.25—KBC2.0 (When D2.5) • RKC2.25 (When D4.5) • DKC3 (When D6) • SKC2.5 (When D5) • KGC1.5—AG125 (When D3) • KTC3.25 (When D6.5) ❗ It remains at D tolerance even when D/2 is designated to fit shaft diameter. To designate an arbitrary flat size  Unit of designation Designation method 0.1mm increments only • VKC1.4 • VWC2.3 • KC1.4 • WKC2.3 • KAC1.4—KBC1.6 • RKC1.4 • DKC1.75 • SKC5.8 • KGC1.4—AG135 • KTC2.3	**Quotation**
		Key flat cutting (precision) 	**VWC**	Two parallel flats cutting (precision) ❗ High speed steel SKH51 equivalent only Range of designation D/2≦VWC<H/2		
		Key flat cutting 	**KC**	Single flat cutting Range of designation D/2≦KC<H/2		
		Key flat cutting 	**WKC**	Two parallel flat cutting Range of designation D/2≦WKC<H/2		
		Key flat cutting 	**KAC KBC**	Varied width parallel flats cutting Range of designation D/2≦KAC KAC<KBC<H/2		
		Key flat cutting 	**RKC**	Right angled two flats cutting Range of designation D/2≦RKC<H/2		
		Key flat cutting 	**DKC**	Three flats cutting Range of designation D/2≦DKC<H/2		
		Key flat cutting 	**SKC**	Four flats cutting Range of designation D/2≦SKC<H/2		
		Key flat cutting (angled) 	**KGC**	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation ❗ 0° <AG<360° D/2≦KGC<H/2 AG=1° increments		
		Key flat cutting (angled) 	**KTC**	Three flats cutting at 120° Range of designation D/2≦KTC<H/2		
	Stepped Ejector Pins with Tip Process & Stepped Ejector Pins with Engraving	**Key flat cutting (angled)** 	**AKC**	Changes the flat position (standard: 0°) clockwise in 1° increments. Range of designation 0° ≦AKC<360° ❗ No need to designate AKC0 Unit of designation 1° increments Designation method θ=45° ⋯→ AKC45		
		Key flat cutting (angled) 	**AWC**	Adds two parallel flats at the standard (0°) position, moreover at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° ≦AWC<360° Unit of designation 1° increments Designation method θ=0° ⋯→ AWC0, θ=45° ⋯→ AWC45		
		Key flat cutting (angled) 	**ARC**	Adds two right-angled flats at the standard (0°)position, moreover at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° ≦ARC<360° Unit of designation 1° increments Designation method θ=0° ⋯→ ARC0, θ=45° ⋯→ ARC45		
		Key flat cutting (angled) 	**ADC**	Adds three flats at the standard (0°) position, moreover at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° ≦ADC<360° Unit of designation 1° increments Designation method θ=0° ⋯→ ADC0, θ=45° ⋯→ ADC45		
		Key flat cutting (angled) 	**KGA**	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0° <KGA° <360° Unit of designation 1° increments Designation method θ=135° ⋯→ KGA135		
		Key flat cutting (angled) 	**KGB**	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position). ❗ Please note that standard position 0° is upper surface which is different from other alterations. Range of designation 0° <KG° <360° Unit of designation 1° increments Designation method θ=135° ⋯→ KGB135		
		Key flat cutting 	**KAC KBC**	Varied width parallel flats cutting ⊗ Combination with other key flat cutting not available Range of designation D/2≦KAC KAC<KBC<H/2		

❗ Note that designating H/2—0.15 or more for Key flat cutting alteration will create hardly any flat on the head.

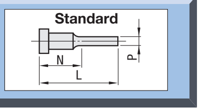
■Alteration Guide for Stepped Ejector Pins

<table>
<tr><th>Items</th><th>Applicable Products</th><th>Alterations</th><th>Codes</th><th>Specifications</th><th>1Code</th></tr>
<tr><td rowspan="9"> Head alteration</td><td rowspan="9">Stepped Ejector Pins</td><td>Head diameter change
 </td><td>HC</td><td>Reduces head diameter.
Range of designation D+1≦HC<H and D≧1.5
Unit of designation 0.1mm increments
Designation method HC6.5</td><td rowspan="9">Quotation</td></tr>
<tr><td>Head diameter change (precision)
 </td><td>HCC</td><td>Reduces head diameter. (Precision)
Range of designation D+1≦HCC<H—0.3 and D≧1.5
Unit of designation 0.1mm increments
Designation method HCC6.1</td></tr>
<tr><td>Head thickness change
 </td><td>TC</td><td>Reduces the head thickness from the standard.
Dimension L remains unchanged (except blank type).
Range of designation T/2≦TC<T ❗ D≧1.5 ❗ T—TC≦Lmax.—L</td></tr>
<tr><td>Dowel hole boring
 </td><td>NC</td><td>Dowel hole boring
Adds a dowel hole for use with WSP and MS.
Designation method NC ❗ Available when head diameter H≧4
⊗ Combination with other than NHC・NHN・TMC・GVC not available.<table><tr><th>T</th><th>d</th><th>ℓ</th></tr><tr><td>4</td><td>2</td><td>3</td></tr><tr><td>6</td><td rowspan="2">3</td><td rowspan="3">5</td></tr><tr><td>8</td></tr><tr><td>10</td><td>4</td></tr></table></td></tr>
<tr><td>Dowel hole+ Spring pin
 </td><td>NCW</td><td>Adds a dowel hole and drives a spring pin.
Designation method NCW ❗ Available when head diameter H≧4
⊗ Combination with other than NHC・NHN・TMC・GVC not available.<table><tr><th>T</th><th>d</th><th>ℓ1</th><th>Spring pin</th></tr><tr><td>4</td><td>2</td><td rowspan="4">5</td><td>WSP2</td></tr><tr><td>6</td><td rowspan="2">3</td><td rowspan="2">WSP3</td></tr><tr><td>8</td></tr><tr><td>10</td><td>4</td><td>WSP4</td></tr></table></td></tr>
<tr><td> </td><td>NCS</td><td>Adds a dowel hole and drives a dowel pin.
❗ Available when head diameter H≧4
⊗ Combination with other than NHC・NHN not available.<table><tr><th>T</th><th>d</th><th>ℓ2</th></tr><tr><td>4</td><td>2</td><td rowspan="3">5</td></tr><tr><td>6</td><td rowspan="2">3</td></tr><tr><td>8</td></tr></table></td></tr>
<tr><td>Numbering
 </td><td>NHC</td><td>Numbering on the head.
Electrolytic marking of ID code on the head (in 5 point, Round Gothic type).
Available characters Numerals: 0～9; Alphabets: A～Z
Range of designation 1 character when 2≦H<4.9
1 or 2 characters when 5≦H<6.9 (Only the first character may be an alphabet.)
Up to 3 characters when 7≦H (Only the first character may be an alphabet.)
Designation method NHC—6, NHC—23, NHC—A90
❗ Available when head diameter H≧2 ⊗ Combination with SKC・MC not available.
⊗ NHC is not available when numbering space in head exceeds the maximum of 1.8 long x 1.8 wide x characters.</td></tr>
<tr><td>Numbering
 </td><td>NHN</td><td>Automatic sequential numbering on the head
Adds a sequential number on the head of each ejector pin when two or more pieces of identical size are ordered.
Available characters Same as NHC (see above)
Range of designation Same as NHC (see above)
Designation method When 3 pieces are ordered with NHN—1, a sequential number starting from 1 is added on the head of each piece.
When 10 pieces are ordered with NHN-A15, a sequential number starting from A15 (through A24) is added on the head of each piece.
❗ Available when head diameter H≧2 ⊗ Combination with SKC・MC not available.
❗ Only available when two or more pieces of identical size are ordered.
⊗ NHN is not available when numbering space in head exceeds the maximum of 1.8 long x 1.8 wide x characters.</td></tr>
<tr><td>Tapping
 </td><td>MC</td><td>Creates a tap on the head. ❗ Available when D≧8, H≧13, T≧8
Designation method MC When D 8.00～ 9.99 M4
When D10.00～11.99 M5
When D12.00～15.99 M6
When D16.00～20.00 M8
⊗ Combination with key flat cutting (NC, NCW, NCS, HC, HCC, NHC, NHN) not available.</td></tr>
<tr><td>Tolerance alteration</td><td>Extra Precision Stepped Ejector Pins</td><td>Tolerance of tip change
 </td><td>PKC</td><td>Tolerance of tip can be changed.
$^{0}_{-0.002}$ ⋯→ $^{-0.001}_{-0.003}$
Designation method PKC</td><td></td></tr>
<tr><td rowspan="2">Tip alteration</td><td rowspan="2">Stepped Ejector Pins</td><td>Lapping on the tip face
 </td><td>TMC</td><td>Performs lapping on the tip face.
Available for L dimension designation and L・P dimension designation types when the material is SKH51 equivalent or SUS440C.
❗ Available when P≧0.6</td><td></td></tr>
<tr><td>Simple lapping on the tip face
 </td><td>PFC</td><td>Performs simple lapping on the tip face.
❗ Applicable for the Tip R processed/P・L dimension designation type pins.</td><td></td></tr>
<tr><td rowspan="2">Shaft alteration</td><td>Stepped Ejector Pins</td><td>Gas vent machining
 </td><td>GVC</td><td>Gas vent machining
Range of designation 2≦S≦10, S+5≦B≦30
Unit of designation S, B=1mm increments
Designation method GVC—S3—B20 ❗ Available when P≧3<table><tr><th>P</th><th>t</th></tr><tr><td>3.00 ～ 4.99</td><td>0.3</td></tr><tr><td>5.00 ～ 9.99</td><td>0.4</td></tr><tr><td>10.00 ～ 12.00</td><td>0.5</td></tr></table></td><td></td></tr>
<tr><td>Extra Precision Stepped Ejector Pins</td><td>Relief under the head
</td><td>TRN</td><td>Relief under the head
Designation method TRN</td><td></td></tr>
<tr><td rowspan="3">Engraving alteration</td><td rowspan="3">Stepped Ejector Pins with Engraving</td><td> </td><td>GCB</td><td>Range of designation 60° ≦GCB<90°
Unit of designation 1° increments
Designation method GCB85 ❗ Available when L≦200 ⊗ Combination with GCD not available.</td><td></td></tr>
<tr><td> </td><td>GCD</td><td>Range of designation 60° ≦GCD° <90°
Unit of designation 1° increments
Designation method GCD80 ❗ Available when L≦200 ⊗ Combination with GCB not available.</td><td></td></tr>
<tr><td> </td><td>EC</td><td>Changes the depth of engraving
0.05 ⋯→ 0.1 (0.1 ⋯→ 0.2)
Designation method EC ❗ Available when P≧1 ⊗ Combination with GCB/GCD not available.</td><td></td></tr>
</table>

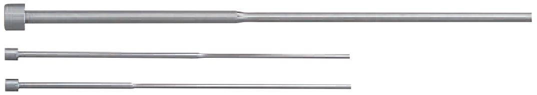
High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS

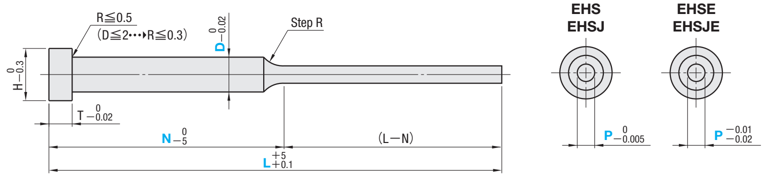
—STANDARD—



Non JIS material definition is listed on P.1351 - 1352



RoHS



Part Number	Head thickness	T P
EHS	4mm(T4)	$^{0}_{-0.005}$
EHSJ	6mm(JIS)	
EHSE	4mm(T4)	$^{-0.01}_{-0.02}$
EHSJE	6mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

H	T	Part Number Type	D	L	P	N
3	4	EHS ($P^{0}_{-0.005}$) EHSE ($P^{-0.01}_{-0.02}$)	1	60	(0.3) (0.4) (0.5) 0.6 0.7 0.8	20 35
				100	(0.3) (0.4) (0.5) 0.6 0.7 0.8	40 50 60
			1.5	60	(0.3) (0.4) (0.5)	20 35
				100	(0.3) (0.4) (0.5) 0.6 0.7 0.8 0.9 1.0 1.2	40 50 60
				150	(0.5) 0.6 0.7 0.8 0.9 1.0 1.2	50 70 90
4			2	100	0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.8	40 50 60
				150	0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.8	40 50 70 90
				200	0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.8	70 80 100
5			2.5	150	0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1	50 70 90
				200	0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1	70 80 100
6			3	150	1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6	50 70 90
				200	1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6	70 80 100
8	6	EHSJ ($P^{0}_{-0.005}$) EHSJE ($P^{-0.01}_{-0.02}$)	4	150		50 70
				200	2.0 2.5 3.0	70 100
				250		100 125
			4.5	150		50 70
				200	2.0 2.5	70 100
				250		100 125
9			5	150		50 70
				200	3.0	70 100
				250		100 125

The figures in ( ) for P dimensions are applicable for EHS only.

Order

Part Number	—	L	—	P	—	N
EHS 2	—	150	—	1.0	—	70
EHSE 2.5	—	200	—	P1.5	—	N70

Note that alphabetical characters (P, N) are not necessary in ordering**EHS**

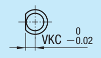
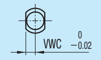
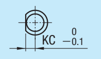
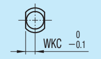
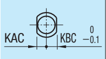
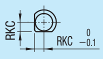
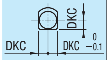
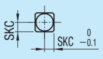
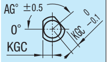
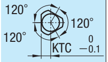
Days to Ship Quotation

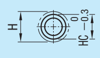
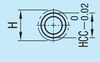
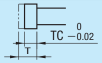
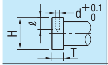
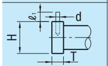
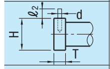
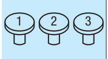
Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC···etc.)
EHS 2	—	150	—	1.0	—	70	—	RKC1

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 Dimensions L and N become shorter by (T-TC).	
	NC	Dowel hole boring Available when head diameter H≧4 Combination with other than NHC・NHN not available. T / d / ℓ: 4 / 2 / 3; 6 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T / d / ℓ1: 4 / 2 / 5; 6 / 3 / 5	
	NCS	Dowel hole boring+Dowel pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T / d / ℓ2: 4 / 2 / 5; 6 / 3 / 5	
	NHC	Numbering on the head How to order P.128 Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 Combination with SKC not available.	

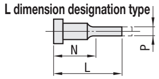
Price Quotation

High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS

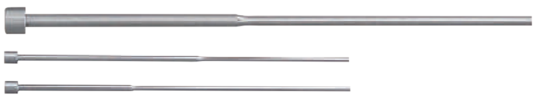
—L DIMENSION DESIGNATION TYPE—

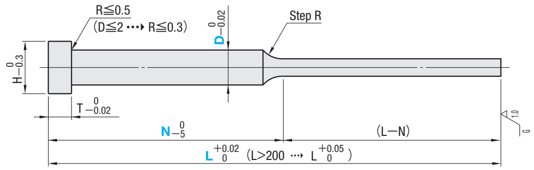
L dimension designation type

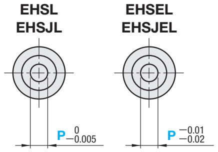


Non JIS material definition is listed on P.1351 - 1352

RoHS







Part Number	Head thickness	T P
EHSL	4mm(T4)	$^{0}_{-0.005}$
EHSJL	6mm(JIS)	
EHSEL	4mm(T4)	$^{-0.01}_{-0.02}$
EHSJEL	6mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

H	T	Part Number Type	D	L 0.01mm increments	P	N
3	4	EHSL ($P^{0}_{-0.005}$) EHSEL ($P^{-0.01}_{-0.02}$)	1	50.00～ 60.00	(0.3) (0.4) (0.5) 0.6 0.7 0.8	20 35
				60.01～100.00		40 50 60
			1.5	50.00～ 60.00	(0.3) (0.4) (0.5)	20 35
				60.01～100.00	(0.3) (0.4) (0.5) 0.6 0.7 0.8 0.9 1.0 1.2	40 50 60
				100.01～150.00	(0.5) 0.6 0.7 0.8 0.9 1.0 1.2	50 70 90
				150.01～200.00	0.6 0.7 0.8 0.9 1.0 1.2	70 80 100
4			2	50.00～100.00	0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.8	40 50 60
				100.01～150.00		40 50 70 90
				150.01～200.00		70 80 100
5			2.5	50.00～100.00	0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1	40 50 60
				100.01～150.00		50 70 90
				150.01～200.00		70 80 100
6			3	100.00～150.00	1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6	50 70 90
				150.01～200.00		70 80 100
8	6	EHSJL ($P^{0}_{-0.005}$) EHSJEL ($P^{-0.01}_{-0.02}$)	4	100.00～150.00	2.0 2.5 3.0	50 70
				150.01～200.00		70 100
				200.01～250.00		100 125
			4.5	100.00～150.00	2.0 2.5	50 70
				150.01～200.00		70 100
				200.01～250.00		100 125
9			5	100.00～150.00	3.0	50 70
				150.01～200.00		70 100
				200.01～250.00		100 125

The figures in ( ) for P dimensions are applicable for EHSL only. L−N≧10

Order

Part Number	—	L	—	P	—	N
EHSJL 4	—	240.30	—	P2.5	—	N100

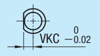
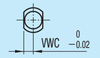
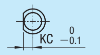
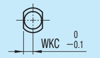
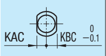
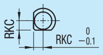
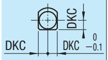
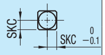
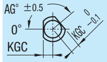
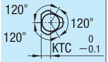
Days to Ship **Quotation**

Alterations

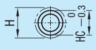
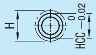
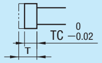
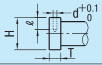
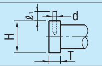
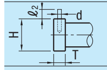
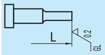
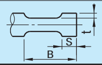
Part Number	—	L	—	P	—	N	—	(KC・WKC···etc.)
EHSL 2	—	150.00	—	P1.5	—	N70	—	KTC1.5

Quotation

Alteration details P.127

Alterations	Code	Spec.	1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2	
	KC	Single flat cutting D/2≦KC<H/2	
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting
(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible
(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

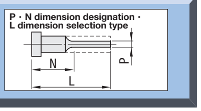
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T−TC≦Lmax.−L Dimension L remains unchanged. Dimensions N becomes shorter by (T−TC).	
	NC	Dowel hole boring Available when head diameter H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T 4 6 / d 2 3 / ℓ 3 5	
	NCW	Dowel hole boring+Spring pin driving Available when head diameter H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T 4 6 / d 2 3 / ℓ1 5	
	NCS	Dowel hole boring+Dowel pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T 4 6 / d 2 3 / ℓ2 5	
	NHC	Numbering on the head How to order P.128 Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 Combination with SKC not available.	
	TMC	Lapping on the tip face Available when P≧0.6	
	GVC	S, B=1mm increments Available for P=3.0 only 2≦S≦10, S+5≦B≦30	

Price **Quotation**

High Speed Steel
SKH51
equivalent

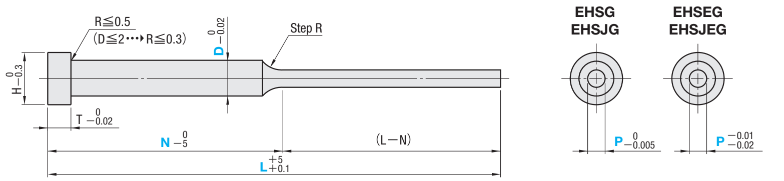
STEPPED EJECTOR PINS

—P・N DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number	Head thickness	T P
EHSG	4mm(T4)	$^{\ \ 0}_{-0.005}$
EHSJG	6mm(JIS)	
EHSEG	4mm(T4)	$^{-0.01}_{-0.02}$
EHSJEG	6mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

4mm head		JIS head		Part Number			L	P	N
				Type					
H	T	H	T	4mm head	JIS head	D	Selection	0.01mm increments	1mm increments
3	4	—	—	EHSG ($P^{\ \ 0}_{-0.005}$) EHSEG ($P^{-0.01}_{-0.02}$)	—	1	60 100	0.60 ～ 0.90	N≧15 and 15≦(L−N)≦150
						1.5	60 100 150 200	0.60 ～ 1.40	
4						2	100 150 200	0.80 ～ 1.90	
5						2.5	150 200	0.80 ～ 2.40	
6						3	150 200 250	1.00 ～ 2.90	・N≧15(T4) ・N≧30(JIS) and 20≦(L−N)≦200
7		8	6		EHSJG ($P^{\ \ 0}_{-0.005}$) EHSJEG ($P^{-0.01}_{-0.02}$)	4	150 200 250	1.50 ～ 3.90	
8						4.5	150 200 250	2.50 ～ 4.40	
		9				5	150 200 250	3.00 ～ 4.90	

For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of EHSG ($P^{\ \ 0}_{-0.005}$), EHSEG ($P^{-0.01}_{-0.02}$).

Order

Part Number	—	L	—	P	—	N
EHSJG 5	—	200	—	P3.00	—	N50

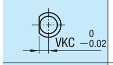
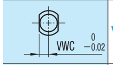
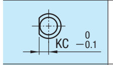
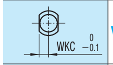
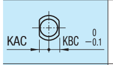
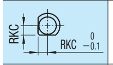
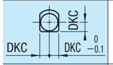
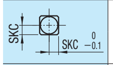
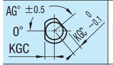
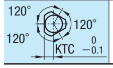
Days to Ship Quotation

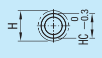
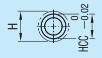
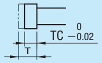
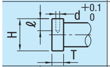
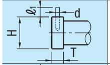
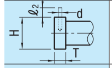
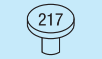
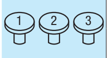
Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC…etc.)
EHSJEG 5	—	200	—	P3.00	—	N50	—	SKC2.5

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 Dimension L becomes shorter by (T−TC). Dimensions N remain unchanged.	
	NC	Dowel hole boring Available when head diameter H≧4 Combination with other than NHC・NHN not available. T 4, 6 / d 2, 3 / ℓ 3, 5	Quotation
	NCW	Dowel hole boring+Spring pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T 4, 6 / d 2, 3 / $ℓ_1$ 5	
	NCS	Dowel hole boring+Dowel pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T 4, 6 / d 2, 3 / $ℓ_2$ 5	
	NHC	Numbering on the head How to order P.128 Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 Combination with SKC not available.	

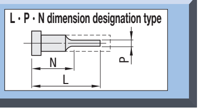
Price Quotation

High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS

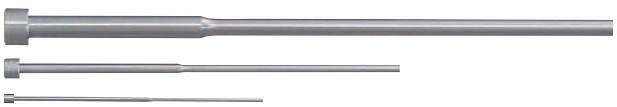
—L・P・N DIMENSION DESIGNATION TYPE—

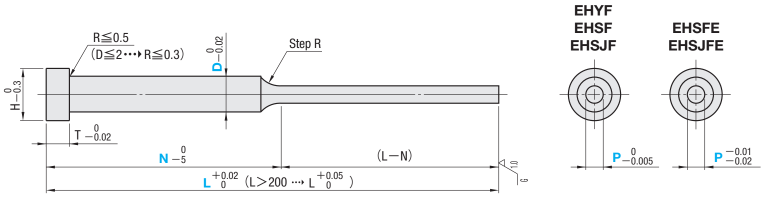
L・P・N dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Head thickness	T P
EHYF(Small diameter)	4mm(T4)	$^{\ 0}_{-0.005}$
EHSF		
EHSJF	6・8mm(JIS)	
EHSFE	4mm(T4)	$^{-0.01}_{-0.02}$
EHSJFE	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details **P.1303**)
※EHYF is applied with overall quenching (its head without annealing).

H	T	Part Number Type	D	L 0.01mm increments	P 0.005mm increments	N 1mm increments	U/Price 1～4
2	4	**EHYF** (Small diameter)	0.5	30.00 ～ 60.00	0.300 ～ 0.400	N≧15 and (L−N)≧15	Quotation
			0.6		0.300 ～ 0.500		
			0.7		0.300 ～ 0.600		
			0.8		0.300 ～ 0.700		
			0.9		0.300 ～ 0.800		
			1		0.300 ～ 0.900		
			1.1		0.300 ～ 1.000		
			1.2		0.300 ～ 1.100		

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	D	0.01mm increments L	0.01mm increments P	1mm increments N
3	4	—	—	**EHSF** ($P^{\ 0}_{-0.005}$) **EHSFE** ($P^{-0.01}_{-0.02}$)	—	1	40.00 ～ 100.00	0.30 ～ 0.90	N≧15 and 15≦(L−N)≦150 When L250.01～300.00 50≦(L−N)≦150
							100.01 ～ 150.00	0.60 ～ 0.90	
						1.1	40.00 ～ 200.00	0.60 ～ 1.00	
						1.2		0.60 ～ 1.10	
						1.3		0.60 ～ 1.20	
						1.4		0.60 ～ 1.30	
						1.5		0.60 ～ 1.40	
4						1.6	40.00 ～ 250.00	0.80 ～ 1.50	
						1.7		0.80 ～ 1.60	
						1.8		0.80 ～ 1.70	
						1.9		0.80 ～ 1.80	
						2	40.00 ～ 300.00	0.80 ～ 1.90	
5						2.5		0.80 ～ 2.40	
6						3	40.00 ～ 350.00 (50.00 ～ 350.00)	1.00 ～ 2.90	・N≧15(T4) ・N≧30(JIS) and 20≦(L−N)≦200 When L300.01～350.00 50≦(L−N)≦200
7						3.5		1.50 ～ 3.40	
		8	6		**EHSJF** ($P^{\ 0}_{-0.005}$) **EHSJFE** ($P^{-0.01}_{-0.02}$)	4		1.50 ～ 3.90	
8						4.5		2.50 ～ 4.40	
		9				5	40.00 ～ 350.00 (50.00 ～ 350.00)	3.00 ～ 4.90	
9						5.5		3.50 ～ 5.40	
		10				6		4.00 ～ 5.90	
10		11				6.5		4.50 ～ 6.40	
						7		4.90 ～ 6.90	
11		13	8			8		5.90 ～ 7.90	
14		14				9		6.90 ～ 8.90	
15		15				10		7.90 ～ 9.90	
17		17				12		8.90 ～ 11.90	

The figures in parentheses ( ) for L dimensions are applicable for EHSJF and EHSJFE only.
For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of EHSF ($P^{\ 0}_{-0.005}$), EHSFE ($P^{-0.01}_{-0.02}$).

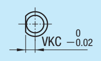
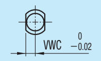
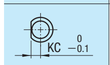
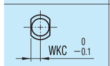
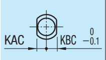
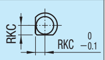
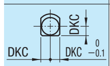
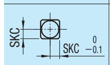
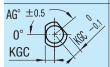
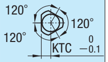
Order Part Number — L — P — N
EHSJF 5 — 300.00 — P3.00 — N150

Days to Ship Quotation

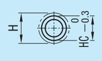
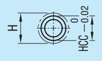
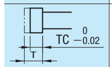
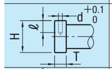
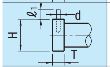
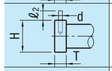
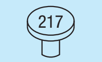
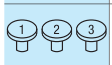
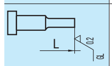
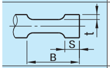
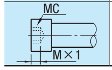
Alterations Part Number — L — P — N — (KC・WKC…etc.)
EHSJFE 7 — 180.00 — P6.60 — N50 — SKC4.0

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	**VKC**	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**VWC**	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	**KC**	Single flat cutting D/2≦KC<H/2		
	**WKC**	Two flats cutting D/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
	**DKC**	Three flats cutting D/2≦DKC<H/2		
	**SKC**	Four flats cutting D/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

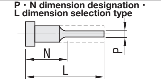
Price Quotation

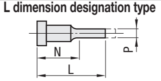
Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	**TC**	TC=0.1mm increments T/2≦TC<T, D≧1.5 (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when head diameter H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	**NCW**	Dowel hole boring+Spring pin driving Available when head diameter H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ1: 4 / 2 / 5; 6, 8 / 3 / 5	
	**NCS**	Dowel hole boring+Dowel pin driving Available when head diameter H≧4 Combination with other than NHC・NHN not available. T / d / ℓ2: 4 / 2 / 5; 6, 8 / 3 / 5	
	**NHC**	Numbering on the head How to order **P.128** Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order **P.128** Combination with SKC not available.	
	**TMC**	Lapping on the tip face Not available for EHYF Available when P≧0.6	
	**GVC**	S, B=1mm increments 2≦S≦10, S+5≦B≦30 Available when P≧3	
	**MC**	Head tapping Available when D≧8, H≧13, T=8 Combination with other than TMC/GVC not available D / M: 8～9 / M4; 10 / M5; 12 / M6	

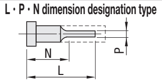
High Speed Steel
SKH51 equivalent
4mm head

EXTRA PRECISION STEPPED EJECTOR PINS

—P・N DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE／L DIMENSION DESIGNATION TYPE／L・P・N DIMENSION DESIGNATION TYPE—

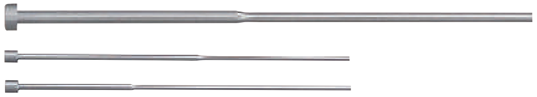


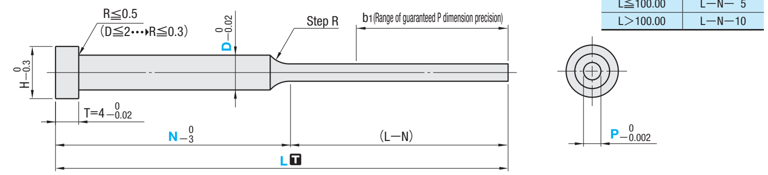




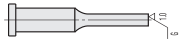
Non JIS material definition is listed on P.1351 - 1352

RoHS





L	b1min.
L≦100.00	L−N− 5
L>100.00	L−N−10

Part Number	Type	Head thickness	T L	T P	Tip Face Roughness
EVSG	P・N DESIGNATION DESIGNATION・L DIMENSION SELECTION TYPE	4mm (T4)	+5 +0.1	0 −0.002	−
EVSL	L DIMENSION DESIGNATION TYPE		+0.01 0		
EVSF	L・P・N DIMENSION DESIGNATION TYPE				

The heads of extra precision ejector pins are not annealed in order to guarantee precision. Use a construction that supports sliding and does not readily apply a load to the flange of the ejector pin, such as by using a precision ejector guide pin&bushing.

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)
※Overall quenching
(No annealing on head)

■P・N dimension designation・L dimension selection type

H	T	Part Number Type	D	L Selection	P 0.001mm increments	N 1mm increments
3	4	EVSG	1	60	0.300～0.900	When L60・100 N≧15 and (L−N)≧15
				100	0.500～0.900	
				150	0.600～0.900	
			1.5	60	0.300～1.400	
				100	0.500～1.400	
				150	0.600～1.400	
4			2	100 150	0.800～1.900	When L150 N≧15 and (L−N)≧50
5			2.5	100 150	0.800～2.400	
6			3	100 150	1.000～2.900	

■L DIMENSION DESIGNATION TYPE

H	T	Part Number Type	D	L 0.01mm increments	P	N
3	4	EVSL	1	50.00 ～ 60.00	0.3 0.4 0.5 0.6	30
				60.01 ～ 100.00	0.5 0.6	40
				100.01 ～ 150.00	0.6 0.8	50 60 70
			1.5	50.00 ～ 60.00	0.3 0.4 0.5 0.6	30
				60.01 ～ 100.00	0.5 0.6 0.8	40
				100.01 ～ 150.00	0.6 0.8 1.0	50 60 70
4			2	60.00 ～ 100.00	0.8 1.0 1.2 1.5	40
				100.01 ～ 150.00		50 60 70
5			2.5	60.00 ～ 100.00	1.0 1.5 2.0	40
				100.01 ～ 150.00		50 60 70
6			3	60.00 ～ 100.00	1.2 1.5 2.0	40
				100.01 ～ 150.00		50 60 70

■L・P・N DIMENSION DESIGNATION TYPE

H	T	Part Number Type	D	L 0.01mm increments	P 0.001mm increments	N 1mm increments
3	4	EVSF	1	50.00 ～ 100.00	0.300 ～ 0.900	When L≦100.00 N≧15 and (L−N)≧15
				100.01 ～ 150.00	0.600 ～ 0.900	
			1.5	60.00 ～ 100.00	0.300 ～ 1.400	
				100.01 ～ 150.00	0.600 ～ 1.400	
4			2	60.00 ～ 150.00	0.800 ～ 1.900	When L>100.00 N≧15 and (L−N)≧50
5			2.5	60.00 ～ 150.00	0.800 ～ 2.400	
6			3	60.00 ～ 150.00	1.000 ～ 2.900	

Order

Part Number	—	L	—	P	—	N
EVSG 3	—	100	—	P2.900	—	N50
EVSL 3	—	150.00	—	P2.0	—	N70

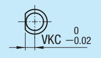
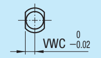
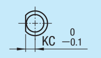
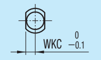
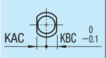
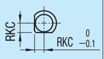
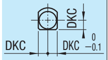
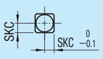
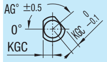
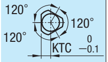
Days to Ship Quotation

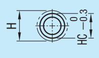
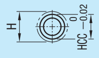
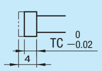
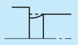
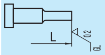
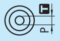
Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC…etc.)
EVSL 2	—	150.00	—	P1.5	—	N70	—	KTC1.5

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

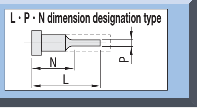
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments 2.0≦TC<4, D≧1.5 EVSL, EVSF ⋯→ 4−TC≦Lmax.−L EVSL Dimension L remains unchanged Dimension N becomes shorter by (4−TC). EVSF Dimension L・N remains unchanged EVSG ⋯→ Dimension L becomes shorter by (4−TC).	
	TRN	Relief under the head	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	TMC	Lapping on the tip face Available when P≧0.6 Applicable to EVSL, EVSF only	
	PKC	Tolerance of tip change $P^{\ 0}_{-0.002}$ ⋯→ $^{-0.001}_{-0.003}$	

Price Quotation

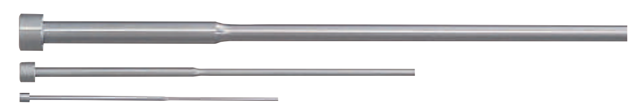
High Speed Steel
SKH51 equivalent
+
Hard chromate plating

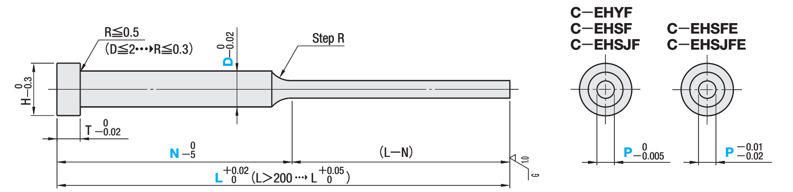
STEPPED EJECTOR PINS

—L・P・N DIMENSION DESIGNATION TYPE—



Non JIS material definition is listed on P.1351 - 1352


RoHS



Part Number	Head thickness	T P
C−EHYF (Small diameter)	4mm(T4)	$^{0}_{-0.005}$
C−EHSF		
C−EHSJF	6・8mm(JIS)	
C−EHSFE	4mm(T4)	$^{-0.01}_{-0.02}$
C−EHSJFE	6・8mm(JIS)	

Tolerances of tip diameter/length are figures after plating.
Plating may extend to the head.

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent+Hard chromate plating
H Surface:900HV~(Reference value)
Base material:58~60HRC

Range of guaranteed base material hardness (Details P.1303)
※C−EHYF is applied with overall quenching. (its head without annealing).

H	T	Part Number Type	Part Number D	L 0.01mm increments	P 0.005mm increments	N 1mm increments	U/Price 1~4
2	4	C−EHYF (Small diameter)	0.5	30.00 ~ 60.00	0.300~0.400	N≧15 and (L−N)≧15	Quotation
			0.6		0.300~0.500		
			0.7		0.300~0.600		
			0.8		0.300~0.700		
			0.9		0.300~0.800		
			1		0.300~0.900		
			1.1		0.300~1.000		
			1.2		0.300~1.100		

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	D	L (0.01mm increments)	P (0.01mm increments)	N (1mm increments)
3	4	—	—	C−EHSF ($P^{0}_{-0.005}$) C−EHSFE ($P^{-0.01}_{-0.02}$)	—	1	40.00 ~ 100.00	0.30~ 0.90	N≧15 and 15≦(L−N)≦150
							100.01 ~ 150.00	0.60~ 0.90	
						1.1	40.00 ~ 200.00	0.60~ 1.00	
						1.2		0.60~ 1.10	
						1.3		0.60~ 1.20	
						1.4		0.60~ 1.30	
						1.5		0.60~ 1.40	
4						1.6	40.00 ~ 250.00	0.80~ 1.50	
						1.7		0.80~ 1.60	
						1.8		0.80~ 1.70	
						1.9		0.80~ 1.80	
						2		0.80~ 1.90	
5						2.5		0.80~ 2.40	
6						3	40.00 ~ 300.00 (50.00 ~ 300.00)	1.00~ 2.90	・N≧15 (T4) ・N≧30 (JIS) and 20≦(L−N)≦200
7						3.5		1.50~ 3.40	
		8	6		C−EHSJF ($P^{0}_{-0.005}$) C−EHSJFE ($P^{-0.01}_{-0.02}$)	4		1.50~ 3.90	
8						4.5		2.50~ 4.40	
		9				5	40.00 ~ 350.00 (50.00 ~ 350.00)	3.00~ 4.90	
9						5.5		3.50~ 5.40	
		10				6		4.00~ 5.90	
10		11				6.5		4.50~ 6.40	
						7		4.90~ 6.90	
11		13	8			8		5.90~ 7.90	
14		14				9		6.90~ 8.90	
15		15				10		7.90~ 9.90	
17		17				12		8.90~11.90	

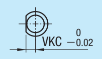
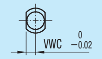
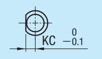
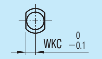
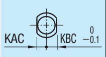
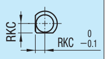
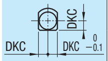
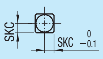
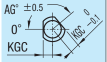
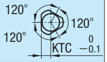
The figures in parentheses ( ) for L dimensions are applicable for C−EHSJF and C−EHSJFE only.
For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of C−EHSF ($P^{0}_{-0.005}$), C−EHSFE ($P^{-0.01}_{-0.02}$).

Order	Part Number	—	L	—	P	—	N
	C−EHSJF 5	—	300.00	—	P3.00	—	N150

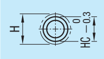
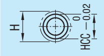
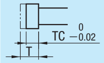
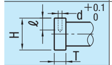
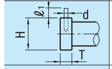
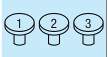
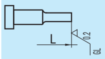
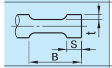
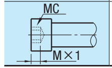
Days to Ship Quotation

Alterations	Part Number	—	L	—	P	—	N	—	(KC・WKC···etc.)
	C−EHSJFE 7	—	180.00	—	P6.60	—	N50	—	SKC4.0

Alteration details P.127

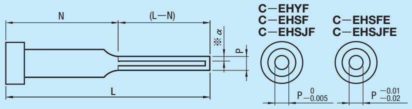
Alterations	Code	Spec.	1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2	
	KC	Single flat cutting D/2≦KC<H/2	
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting
(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible
(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	NC	Dowel hole boring Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN・TMC・GVC not available. T / d / $ℓ_1$: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	TMC	Lapping on the tip face ⊗ Not available for C−EHYF Available when P≧0.6 Hard chromate plating is applied after alternations.	
	GVC	S, B=1mm increments 2≦S≦10, S+5≦B≦30 Available when P≧3 Hard chromate plating is applied after alternations.	
	MC	Head tapping Available when D≧8, H≧13, T=8 ⊗ Combination with other than TMC/GVC not available D / M: 8~9 / M4; 10 / M5; 12 / M6	

P Price Quotation

Hard chromate plating on stepped ejector pins



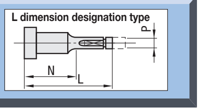
Hard chromate plating for hardness 900 HV or higher is applied to base materials of SKH51 equivalent for improvement of wear resistance.
The thickness of a plating layer of one side (α) is between 0.001 and 0.002 mm (reference value).
By processing a tip diameter (P) of a base material to be thin in consideration of such thickness, the tip diameter (P) precision is guaranteed after plating.
The range of guaranteed plating layer covers the (L-N) dimension section; however, plating may extend to the head as it is applied after dimension L/P/N machining.
The tip surface is plated.
Since the plating layer is too thin for surface hardness testing after plating, the data shown in this catalog are "reference values."

High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS WITH GAS VENT

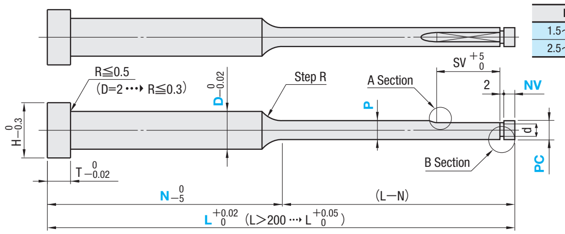
—L DIMENSION DESIGNATION TYPE—

L dimension designation type



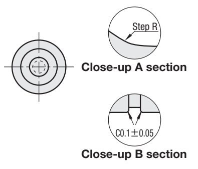
Ⓘ Non JIS material definition is listed on P.1351 - 1352

RoHS



P	d
1.5～2.4	P−0.2
2.5～3.0	P−0.4

L−N	SV
30≦L−N≦50	15
50<L−N	30



Close-up A section

Close-up B section

Part Number	Head thickness	T P (PCX)	T 141
GVB−EHSL	4mm (T4)	$^{0}_{-0.005}$	$^{0}_{-0.005}$
GVB−EHSJL	6mm (JIS)		
GVB−EHSEL	4mm (T4)	$^{-0.01}_{-0.02}$	
GVB−EHSJEL	6mm (JIS)		

Range of guaranteed shaft diameter precision (D) (Details ☞ **P.1301**)
Step R (Details ☞ **P.1302**)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details ☞ **P.1303**)

4mm head		JIS head		Part Number			L	P	N	NV	141
				Type		D	0.01mm increments			0.1mm increments	0.01mm increments
H	T	H	T	4mm head	JIS head						
4	4	—	—	GVB−EHSL (P $^{0}_{-0.005}$)	—	2	70.00～100.00	1.5 1.6 1.8	40 50 60	0.5～8.0	(GVB−EHSL / GVB−EHSJL) P−0.08≦141<P
							100.01～150.00		40 50 70 90		
							150.01～200.00		70 80 100		
5						2.5	100.00～150.00	1.5 1.6 1.7 1.8 1.9 2.0 2.1	50 70 90		
							150.01～200.00		70 80 100		
							200.01～250.00		80 100 125		
6						3	100.00～150.00	1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6	50 70 90		
							150.01～200.00		70 80 100		
							200.01～250.00		80 100 125		
7		8	6	GVB−EHSEL (P $^{-0.01}_{-0.02}$)	GVB−EHSJL (P $^{0}_{-0.005}$)	4	100.00～150.00	2.0 2.5 3.0	50 70		(GVB−EHSEL / GVB−EHSJEL) P−0.08≦141<P−0.02 Ⓘ When PC=P, PCX is applied.
							150.01～200.00		70 100		
							200.01～250.00		100 125		
8					GVB−EHSJEL (P $^{-0.01}_{-0.02}$)	4.5	100.00～150.00	2.0 2.5	50 70		
							150.01～200.00		70 100		
							200.01～250.00		100 125		
		9				5	100.00～150.00	3.0	50 70		
							150.01～200.00		70 100		
							200.01～250.00		100 125		

Ⓘ L−N≧30 Ⓘ For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of GVB−EHSL (P $^{0}_{-0.005}$), GVB−EHSEL (P $^{-0.01}_{-0.02}$).

Order

Part Number	—	L	—	P	—	N	—	NV	—	PC(PCX)
GVB−EHSJL 4	—	240.30	—	P2.5	—	N100	—	NV3.0	—	PC2.49
GVB−EHSL 3	—	120.23	—	P2.1	—	N70	—	NV4.1	—	PCX

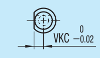
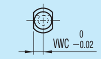
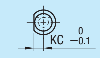
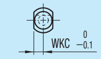
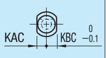
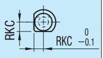
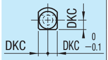
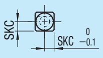
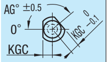
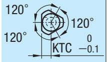
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	N	—	NV	—	PC(PCX)	—	(KC・WKC···etc.)
GVB−EHSL 2	—	150.00	—	P1.5	—	N70	—	NV2.0	—	PC1.46	—	KTC1.5

Quotation

Alteration details ☞ P.127

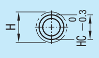
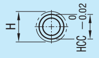
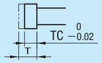
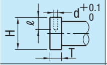
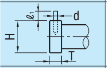
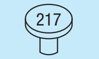
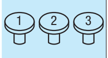
Alterations	Code	Spec.	1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2	
	KC	Single flat cutting D/2≦KC<H/2	
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

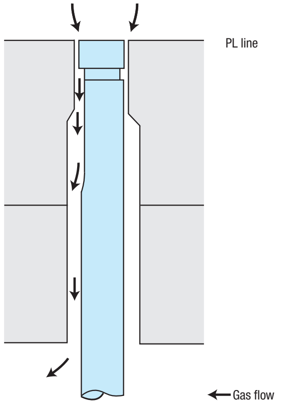
Ⓘ Flat cutting position is set at 90° of SV dimension in counterclockwise direction.

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments Ⓘ D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments Ⓘ D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments Ⓘ T/2≦TC<T, D≧1.5 Ⓘ T−TC≦Lmax.−L Dimension L remains unchanged. Ⓘ Dimensions N becomes shorter by (T−TC).	
	NC	Dowel hole boring Ⓘ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ: 4 / 2 / 3; 6 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Ⓘ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ1: 4 / 2 / 5; 6 / 3 / 5	
	NHC	Numbering on the head How to order ☞ **P.128** ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order ☞ **P.128** ⊗ Combination with SKC not available.	

Price Quotation

Example

■**Characteristics**
Let gas out from the inside of the cavity via the clearance around the ejector pin.

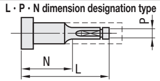


High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS WITH GAS VENT

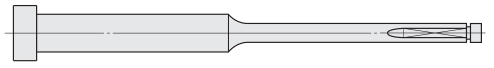
—TIP DIAMETER・L・P・N DIMENSION DESIGNATION TYPE—

L・P・N dimension designation type



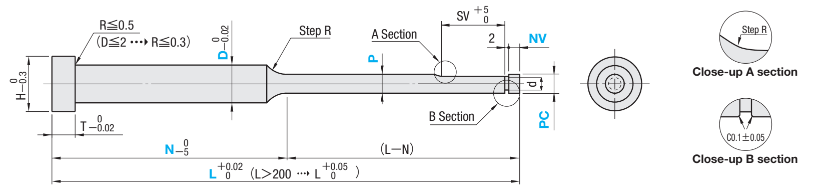
Non JIS material definition is listed on P.1351 - 1352

RoHS



P	d
1.50～2.49	P−0.2
2.50～3.99	P−0.4
4.00～6.00	P−0.6

L−N	SV
30≦L−N≦50	15
50<L−N	30



Part Number	Head Thickness	T P (PCX)	T 143
GVB−EHSF	4mm(T4)	0 −0.005	0 −0.005
GVB−EHSJF	6・8mm(JIS)		
GVB−EHSFE	4mm(T4)	−0.01 −0.02	
GVB−EHSJFE	6・8mm(JIS)		

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

4mm head		JIS head		Part Number			0.01mm increments		1mm increments	0.1mm increments	0.01mm increments
				Type							
H	T	H	T	4mm head	JIS head	D	L	P	N	NV	PC
4	4	—	—	**GVB−EHSF** $(P^{\ 0}_{-0.005})$	—	1.6	70.00 ～ 250.00	1.50	N≧15 and 30≦(L−N)≦150	0.5～8.0	(GVB−EHSF GVB−EHSJF) P−0.08≦143<P
						1.7		1.50 ～ 1.60			
						1.8		1.50 ～ 1.70			
						1.9		1.50 ～ 1.80			
						2		1.50 ～ 1.90			
5						2.5		1.50 ～ 2.40			
6						3	70.00 ～ 300.00	1.50 ～ 2.90	・N≧15 (T4) ・N≧30 (JIS) and 30≦(L−N)≦200		
7						3.5		1.50 ～ 3.40			
		8	6		**GVB−EHSJF** $(P^{\ 0}_{-0.005})$	4		1.50 ～ 3.90			
8						4.5		2.50 ～ 4.40			
		9				5	70.00 ～ 350.00	3.00 ～ 4.90			(GVB−EHSFE GVB−EHSJFE) P−0.08≦143<P−0.02 When PC=P, PCX is applied.
9				**GVB−EHSFE** $(P^{-0.01}_{-0.02})$		5.5		3.50 ～ 5.40			
		10				6		4.00 ～ 5.90			
10		11				6.5		4.50 ～ 6.40			
					GVB−EHSJFE $(P^{-0.01}_{-0.02})$	7		4.90 ～ 6.90			
11		13	8			8		5.90 ～ 7.90			
14		14				9		6.90 ～ 8.90			
15		15				10		7.90 ～ 9.90			
17		17				12		8.90 ～ 11.90			

For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of GVB—EHSF $(P^{\ 0}_{-0.005})$, GVB—EHSFE $(P^{-0.01}_{-0.02})$.

Order

Part Number	—	L	—	P	—	N	—	NV	—	PC(PCX)
GVB−EHSJF 5	—	300.00	—	P3.00	—	N150	—	NV2.0	—	PC2.96

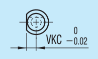
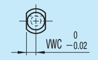
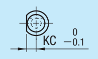
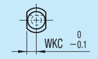
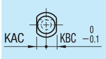
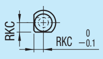
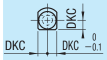
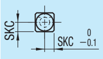
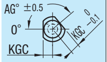
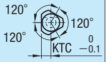
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	N	—	NV	—	PC(PCX)	—	(KC・WKC⋯etc.)
GVB−EHSJFE 7	—	180.00	—	P6.60	—	N50	—	NV2.0	—	PC6.56	—	SKC4.0

Quotation

Alteration details P.127

Alterations	Code	Spec.	1Code
	**VKC**	Single flat cutting (precision) D/2≦VKC<H/2	Quotation
	**VWC**	Two parallel flats cutting (precision) D/2≦VWC<H/2	
	**KC**	Single flat cutting D/2≦KC<H/2	
	**WKC**	Two flats cutting D/2≦WKC<H/2	
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2	
	**DKC**	Three flats cutting D/2≦DKC<H/2	
	**SKC**	Four flats cutting D/2≦SKC<H/2	
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2	

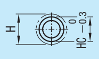
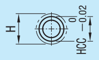
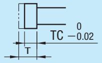
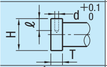
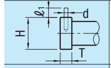
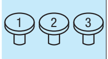
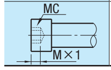
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Flat cutting position is set at 90° of SV dimension in counterclockwise direction.

Price Quotation

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments D+1≦HC<H, D≧1.5	
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	**TC**	TC=0.1mm increments T/2≦TC<T, D≧1.5 (Dimensions L and N remain unchanged.) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	Quotation
	**NCW**	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ1: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	**MC**	Head tapping Available when D≧8, H≧13, T=8 ⊗ Combination with any other alteration not available. D / M: 8～9 / M4; 10 / M5; 12 / M6	

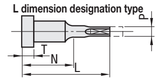
Stepped Ejector Pins

High Speed Steel
SKH51
equivalent

High Speed Steel
SKH51
equivalent

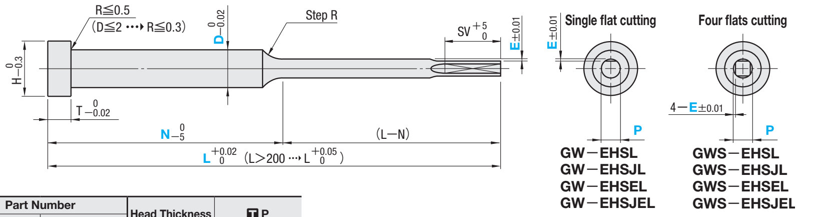
STEPPED EJECTOR PINS WITH GAS VENT

— CUTTING FACETS/L DIMENSION DESIGNATION TYPE —



Non JIS material definition is listed on P.1351 - 1352

RoHS



Single flat cutting
GW−EHSL
GW−EHSJL
GW−EHSEL
GW−EHSJEL

Four flats cutting
GWS−EHSL
GWS−EHSJL
GWS−EHSEL
GWS−EHSJEL

Part Number Single flat cutting	Part Number Four flats cutting	Head Thickness	T P
GW−EHSL	GWS−EHSL	4mm (T4)	0 −0.005
GW−EHSJL	GWS−EHSJL	6mm (JIS)	
GW−EHSEL	GWS−EHSEL	4mm (T4)	−0.01 −0.02
GW−EHSJEL	GWS−EHSJEL	6mm (JIS)	

Limit of E±0.01 is within 10mm from the tip.

L−N	SV
30≦L−N≦50	15
50<L−N	30

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	D	L 0.01mm increments	P	N	E 0.01mm increments
3	4	—	—	Single flat cutting GW−EHSL ($P^{\ 0}_{-0.005}$) GW−EHSEL ($P^{-0.01}_{-0.02}$) Four flats cutting (P≧2) GWS−EHSL ($P^{\ 0}_{-0.005}$) GWS−EHSEL ($P^{-0.01}_{-0.02}$)	—	1	50.00～ 70.00	0.6 0.7 0.8	20 35	Single flat cutting 0.02～0.05 Four flats cutting 0.03～0.05
							70.01～100.00		40 50 60	
						1.5	70.00～100.00	0.6 0.7 0.8 0.9 1.0 1.2	40 50 60	
							100.01～150.00	0.6 0.7 0.8 0.9 1.0 1.2	50 70 90	
							150.01～200.00	0.6 0.7 0.8 0.9 1.0 1.2	70 80 100	
4						2	70.00～100.00	0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.8	40 50 60	
							100.01～150.00		40 50 70 90	
							150.01～200.00		70 80 100	
5						2.5	100.00～150.00	0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1	50 70 90	
							150.01～200.00		70 80 100	
6						3	100.00～150.00	1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6	50 70 90	
							150.01～200.00		70 80 100	
7		8	6		Single flat cutting GW−EHSJL ($P^{\ 0}_{-0.005}$) GW−EHSJEL ($P^{-0.01}_{-0.02}$) Four flats cutting GWS−EHSJL ($P^{\ 0}_{-0.005}$) GWS−EHSJEL ($P^{-0.01}_{-0.02}$)	4	100.00～150.00		50 70	
							150.01～200.00	2.0 2.5 3.0	70 100	
							200.01～250.00		100 125	
8						4.5	100.00～150.00		50 70	
							150.01～200.00	2.0 2.5	70 100	
							200.01～250.00		100 125	
		9				5	100.00～150.00		50 70	
							150.01～200.00	3.0	70 100	
							200.01～250.00		100 125	

L−N≧30 For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type.

Order

Part Number − L − P − N − E
GW−EHSJL 4 − 240.30 − P2.5 − N100 − E0.03

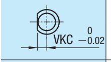
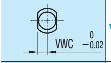
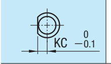
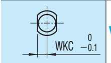
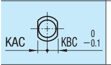
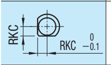
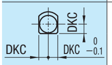
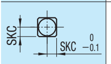
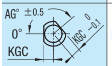
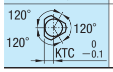
Days to Ship Quotation

Alterations

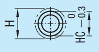
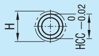
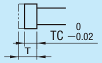
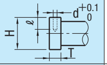
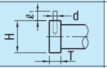
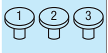
Part Number − L − P − N − E − (KC・WKC···etc.)
GW−EHSL 2 − 150.00 − P1.5 − N70 − E0.03 − KTC1.5

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm Flat cutting position is set at 90° of cutting facet in counterclockwise direction.	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

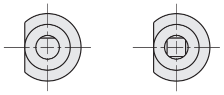
Price Quotation

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T−TC≦Lmax.−L Dimension L remains unchanged. Dimensions N becomes shorter by (T−TC).	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ 4 2 3 6 3 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ_1 4 2 5 6 3 5	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	

About flat cutting position
Flat cutting position is set at 90° of cutting facet in counterclockwise direction.

Ex.: KC

Single flat cutting **Four flats cutting**



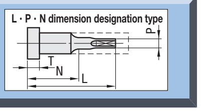
Stepped Ejector Pins

High Speed Steel
SKH51
equivalent

High Speed Steel
SKH51
equivalent

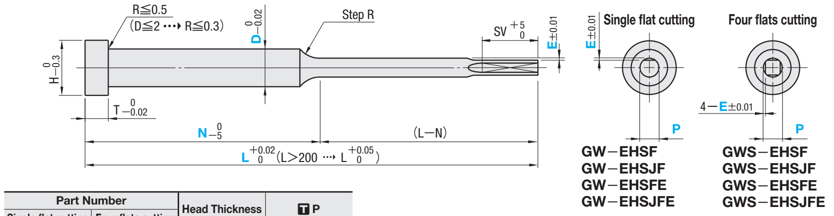
STEPPED EJECTOR PINS WITH GAS VENT

—CUTTING FACETS/L・P・N DIMENSION DESIGNATION TYPE—


L・P・N dimension designation type
P
T
N
L

Non JIS material definition is listed on P.1351 - 1352

RoHS


R≦0.5
(D≦2 ···▸ R≦0.3)
D 0 −0.02
Step R
SV +5 0
E±0.01
H 0 −0.3
T 0 −0.02
N 0 −5
(L−N)
L +0.02 0 (L>200 ···▸ L +0.05 0)
Single flat cutting
Four flats cutting
E±0.01
4−E±0.01
P
P
GW−EHSF
GW−EHSJF
GW−EHSFE
GW−EHSJFE
GWS−EHSF
GWS−EHSJF
GWS−EHSFE
GWS−EHSJFE

Part Number		Head Thickness	T P
Single flat cutting	Four flats cutting		
GW−EHSF	GWS−EHSF	4mm(T4)	$^{0}_{-0.005}$
GW−EHSJF	GWS−EHSJF	6・8mm(JIS)	
GW−EHSFE	GWS−EHSFE	4mm(T4)	$^{-0.01}_{-0.02}$
GW−EHSJFE	GWS−EHSJFE	6・8mm(JIS)	

Limit of E ± 0.01 is within 10mm from the tip.

L−N	SV
30≦L−N≦50	15
50<L−N	30

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

4mm head		JIS head		Part Number			0.01mm increments		1mm increments	0.01mm increments
				Type						
H	T	H	T	4mm head	JIS head	D	L	P	N	E
3	4	—	—	Single flat cutting GW−EHSF ($P^{0}_{-0.005}$) GW−EHSFE ($P^{-0.01}_{-0.02}$) Four flats cutting (D≧2 and P≧1.50) GWS−EHSF ($P^{0}_{-0.005}$) GWS−EHSFE ($P^{-0.01}_{-0.02}$)	—	1	50.00 ～ 150.00	0.60 ～ 0.90	N≧15 and 30≦(L−N)≦150	Single flat cutting 0.02～0.05 Four flats cutting 0.03～0.05
						1.1	50.00 ～ 200.00	0.60 ～ 1.00		
						1.2		0.60 ～ 1.10		
						1.3		0.60 ～ 1.20		
						1.4		0.60 ～ 1.30		
						1.5		0.60 ～ 1.40		
4						1.6	50.00 ～ 250.00	0.80 ～ 1.50		
						1.7		0.80 ～ 1.60		
						1.8		0.80 ～ 1.70		
						1.9		0.80 ～ 1.80		
						2		0.80 ～ 1.90		
5						2.5		0.80 ～ 2.40		
6						3	50.00 ～ 300.00 (60.00 ～ 300.00)	1.00 ～ 2.90	・N≧15 (T4) ・N≧30 (JIS) and 30≦(L−N)≦200	
7						3.5		1.50 ～ 3.40		
		8	6		Single flat cutting GW−EHSJF ($P^{0}_{-0.005}$) GW−EHSJFE ($P^{-0.01}_{-0.02}$) Four flats cutting GWS−EHSJF ($P^{0}_{-0.005}$) GWS−EHSJFE ($P^{-0.01}_{-0.02}$)	4		1.50 ～ 3.90		
8						4.5		2.50 ～ 4.40		
		9				5	50.00 ～ 350.00 (60.00 ～ 300.00)	3.00 ～ 4.90		
9						5.5		3.50 ～ 5.40		
		10				6		4.00 ～ 5.90		
10		11				6.5		4.50 ～ 6.40		
						7		4.90 ～ 6.90		
11		13	8			8		5.90 ～ 7.90		
14		14				9		6.90 ～ 8.90		
15		15				10		7.90 ～ 9.90		
17		17				12		8.90 ～ 11.90		

The figures in parentheses ( ) for L dimensions are applicable for JIS head only.
For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type.

Order

Part Number	—	L	—	P	—	N	—	E
GW−EHSJF 5	—	300.00	—	P3.00	—	N150	—	E0.02

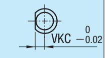
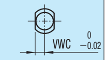
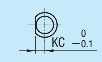
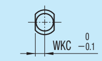
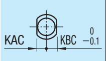
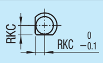
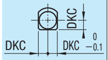
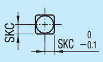
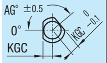
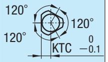
Days to Ship Quotation

Alterations

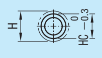
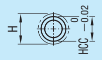
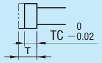
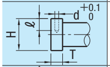
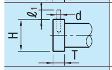
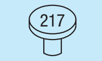
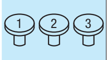
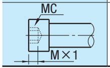
Part Number	—	L	—	P	—	N	—	E	—	(KC・WKC···etc.)
GW−EHSJFE 7	—	180.00	—	P6.60	—	N50	—	E0.02	—	SKC4.0

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm Flat cutting position is set at 90° of cutting facet in counterclockwise direction.	
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC 0 −0.1	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC 0 −0.1	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC 0 −0.1	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Price Quotation

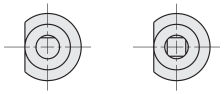
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 (Dimensions L and N remain unchanged.) T−TC≦Lmax.−L	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ: 4 / 2 / 3; 6 / 3 / 5; 8 / 3 / 5	Quotation
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ1: 4 / 2 / 5; 6 / 3 / 5; 8 / 3 / 5	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	MC	Head tapping Available when D≧8, H≧13, T=8 ⊗ Combination with any other alteration not available. D / M: 8～9 / M4; 10 / M5; 12 / M6	

About flat cutting position

Flat cutting position is set at 90° of cutting facet in counterclockwise direction.

Ex.: KC

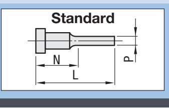
Single flat cutting **Four flats cutting**

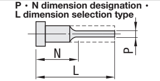


Dies Steel
SKD61 equivalent
+
Nitrided

STEPPED EJECTOR PINS

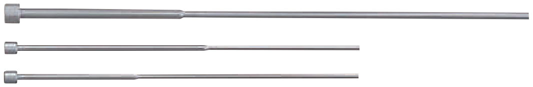
— STANDARD ／ P・N DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE —

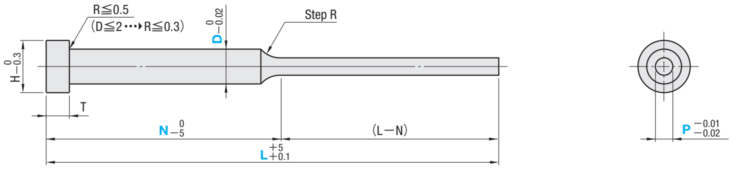




Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Type	Head Thickness	T T
ENS	Standard	4mm(T4)	0 −0.02
ENSG	P・N dimension designation・L dimension selection type		
EJS	Blank type	6mm(JIS)	0 −0.05
EJSG	P・N dimension designation・L dimension selection type		

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKD61 equivalent+Nitrided
H Surface 900HV～
Base material 40～45HRC

Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

■Blank type

H	T	Part Number		L	P	N
		Type	D			
3	4	ENS	1.5	100	0.8 1.0	40 50
				150	0.8 1.0	40 50 70
4			2	100	0.8 1.0 1.2 1.5	40 60
				150	0.8 1.0 1.2 1.5	40 50 70 90
				200	0.8 1.0 1.2 1.5	80 100
5			2.5	100	1.0 1.2 1.5 1.8 2.0	50 60
				150	1.0 1.2 1.5 1.8 2.0	50 60 70 90
				200	1.0 1.2 1.5 1.8 2.0	70 80 100
6			3	100	1.5 1.8 2.0 2.5	50 60
				150	1.5 1.8 2.0 2.5	50 60 70
				200	1.5 1.8 2.0 2.5	70 80 100
8	6	EJS	4	150	1.5 2.0 2.5 3.0	50
				200		70 100
				250		100 125
9			5	150	3.0 3.5 4.0	50
				200		70 100
				250		100 125
10			6	150	4.0	50
				200		70 100
				250		100 125

For less D4 head thickness JIS type is T=4, please place the order for head 4mm type ENS .

■P・N dimension designation・L dimension selection type

4mm head		JIS head		Part Number			L	P	N
H	T	H	T	Type 4mm head	Type JIS head	D	Selection	0.01mm increments	1mm increments
3	4	—	—	ENSG	—	1.5	100 150 200	0.80 ～ 1.40	N≧15 and 15≦(L−N)≦150
4						2		0.80 ～ 1.90	
5						2.5	100 150 200 250 300	0.80 ～ 2.40	
6						3	100 150 200 250 300	1.00 ～ 2.90	・N≧15(T4) and 20≦(L−N)≦200 ・N≧ $\frac{L}{3}$(JIS) and (L−N)≧10
7						3.5		1.50 ～ 3.40	
		8	6		EJSG	4		1.50 ～ 3.90	
8						4.5		2.50 ～ 4.40	
		9				5		3.00 ～ 4.90	
9						5.5		3.50 ～ 5.40	
		10				6		4.00 ～ 5.90	

Nitriding may extend to the head as it is applied after dimension P machining. For less D4 head thickness JIS type is T=4, please place the order for head 4mm type ENSG.

Order

Part Number — L — P — N
ENS 2 — 150 — 1.0 — 70
EJS 4 — 150 — P2.0 — N50
EJSG4 — 200 — P3.00 — N100

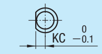
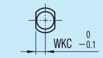
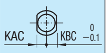
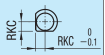
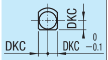
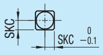
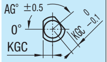
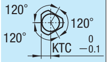
Note that alphabetical characters (P, N) are not necessary in ordering **ENS**.

Days to Ship Quotation

Alterations

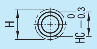
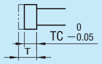
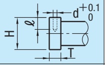
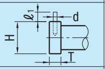
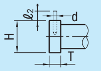
Part Number — L — P — N — (KC・WKC···etc.)
EJS 4 — 150 — P1.5 — N50 — NC
EJSG 4 — 200 — P3.00 — N100 — SKC2.0

Quotation

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting D/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC＜H/2		Quotation
	DKC	Three flats cutting D/2≦DKC＜H/2		
	SKC	Four flats cutting D/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting D/2≦KGC＜H/2 AG=1° increments 0＜AG＜360		
	KTC	Three flats cutting at 120° D/2≦KTC＜H/2		

Price Quotation

Alteration details P.127

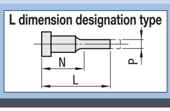
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC＜H	
	TC	TC=0.1mm increments T/2≦TC＜T ENS・EJS ···▸ Dimensions L and N become shorter by (T−TC). ENSG・EJSG ···▸ Dimension L becomes shorter by (T−TC). Dimensions N remains unchanged.	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ / 4 2 3 / 6 3 5	Quotation
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ1 / 4 2 5 / 6 3	
	NCS	Dowel hole boring+Dowel pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. T d ℓ2 / 4 2 5 / 6 3	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	

Dies Steel
SKD61 equivalent
+
Nitrided

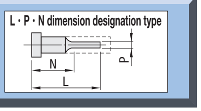
STEPPED EJECTOR PINS

— L DIMENSION DESIGNATION TYPE ／ L・P・N DIMENSION DESIGNATION TYPE —

L dimension designation type

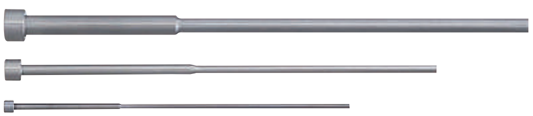


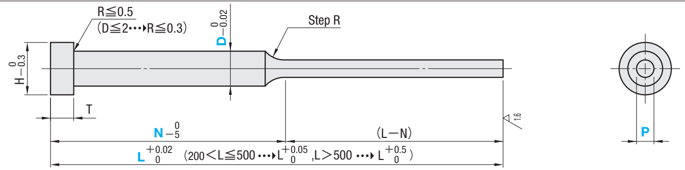
L・P・N dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Type	Head Thickness	T T
ENSL	L dimension designation type	4mm(T4)	$^{0}_{-0.02}$(L>300 ··· T $^{0}_{-0.05}$)
ENSF	L・P・N dimension designation type		
EJSL	L dimension designation type	6・8mm(JIS)	$^{0}_{-0.05}$
EJSF	L・P・N dimension designation type		

T P

L \ D	1.5～8	10～20
L≦500	$^{-0.01}_{-0.02}$	$^{-0.01}_{-0.03}$
L>500	$^{-0.01}_{-0.03}$	$^{-0.01}_{-0.04}$

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)

M SKD61 equivalent+Nitrided
H Surface 900HV～Base material 40～45HRC
Range of guaranteed base material hardness (Details **P.1303**)
Range of guaranteed surface hardness for nitriding (Details **P.1303**)

■L dimension designation type

H	T	Part Number Type	D	L 0.01mm increments	P	N
3	4	ENSL	1.5	50.00～100.00	0.8 1.0	40 50
				100.01～150.00		40 50 70
4			2	50.00～100.00	0.8 1.0 1.2 1.5	40 60
				100.01～150.00		40 50 70 90
				150.01～200.00		80 100
5			2.5	60.00～100.00	1.0 1.2 1.5 1.8 2.0	50 60
				100.01～150.00		50 60 70 90
				150.01～200.00		70 80 100
6			3	60.00～100.00	1.5 1.8 2.0 2.5	50 60
				100.01～150.00		50 60 70
				150.01～200.00		70 80 100
8	6	EJSL	4	100.00～150.00	1.5 2.0 2.5 3.0	50
				150.01～200.00		70 100
				200.01～250.00		100 125
9			5	100.00～150.00	3.0 3.5 4.0	50
				150.01～200.00		70 100
				200.01～250.00		100 125
10			6	100.00～150.00	4.0	50
				150.01～200.00		70 100
				200.01～250.00		100 125

L−N≧10

■L・P・N dimension designation type

4mm head		JIS head		Part Number			L	P	N
				Type			0.01mm increments (L>500 ··· 0.1mm increments)	0.01mm increments	1mm increments
H	T	H	T	4mm head	JIS head	D			
3	4	—	—	ENSF	—	1.5	40.00～200.00	0.80 ～ 1.40	N≧15 and 15≦(L−N)≦150
4						2	40.00～300.00	0.80 ～ 1.90	
5						2.5		0.80 ～ 2.40	
6						3	40.00～400.00	1.00 ～ 2.90	・N≧15 (T4) and 20≦(L−N)≦200
7					EJSF	3.5		1.50 ～ 3.40	
		8	6			4	40.00～400.00 (50.00～600.00)	1.50 ～ 3.90	
8						4.5		2.50 ～ 4.40	
		9				5	40.00～500.00(50.00～600.0)	3.00 ～ 4.90	
9						5.5	40.00～500.00(50.00～500.00)	3.50 ～ 5.40	
		10				6	40.00～500.00 (50.00～700.0)	4.00 ～ 5.90	
10		11				6.5		4.50 ～ 6.40	
						7	40.00～500.00(50.00～800.0)	4.90 ～ 6.90	・N≧$\frac{L}{3}$ (JIS) and (L−N)≧10
11		13	8			8	40.00～500.00 (50.00～900.0)	5.90 ～ 7.90	
15		15				10		7.90 ～ 9.90	
17		17				12		8.90 ～ 11.90	
—	—	20		—		15	50.00～900.0	10.90 ～ 14.90	
		21				16		11.90 ～ 15.90	
		25				20		15.90 ～ 19.90	

The figures in ( ) for L dimension is for EJSF only. Nitriding may extend to the head as it is applied after dimension P machining.
For less D4 head thickness JIS type is T=4, please place the order for head 4mm type ENSF.

Order

Part Number	L	P	N
ENSL 2.5	149.78	P1.5	N70
EJSL 5	223.70	P3.5	N100
EJSF 10	720.5	P9.00	N300

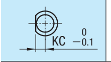
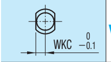
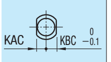
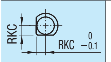
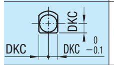
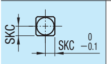
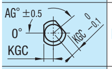
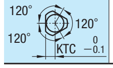
Days to Ship Quotation

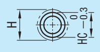
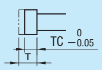
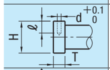
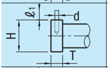
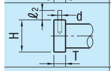
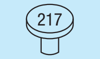
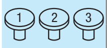
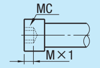
Alterations

Part Number	L	P	N	(KC・WKC···etc.)
ENSL 2.5	149.78	P1.5	N70	NCW
EJSF 10	720.5	P9.00	N300	SKC7.0

Quotation

Alteration details **P.127**

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H	Quotation
	TC	TC=0.1mm increments T/2≦TC<T T−TC≦Lmax.−L ENSL, EJSL ···▸ Dimension L remains unchanged Dimensions N becomes shorter by (T−TC). ENSF, EJSF ···▸ Dimensions L and N remain unchanged.	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN not available. T 4, 6・8 / d 2, 3 / ℓ 3, 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN not available. T 4, 6・8 / d 2, 3 / ℓ_1 5	
	NCS	Dowel hole boring+Dowel pin driving Available when H≧4 Combination with other than NHC・NHN not available. T 4, 6・8 / d 2, 3 / ℓ_2 5	
	NHC	Numbering on the head How to order **P.128** Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order **P.128** Combination with SKC not available.	
	MC	Head tapping Available for EJSF when D≧8, H≧13, T=8 Combination with any other alteration not available. D 8 / M M4; D 10 / M M5; D 12・15 / M M6; D 16・20 / M M8	

Price Quotation

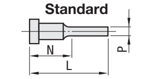
Stepped Ejector Pins

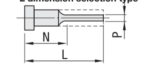
Dies Steel
SKD61 equivalent
+
Nitrided

Dies Steel
SKD61 equivalent
4mm head

STEPPED EJECTOR PINS

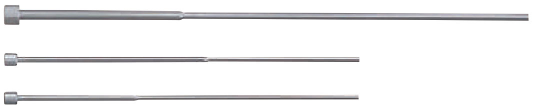
— STANDARD ／ P・N DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE —

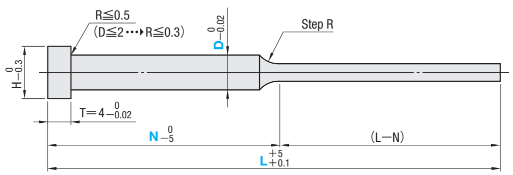
Standard


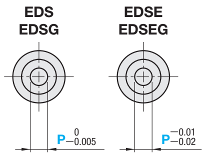
P・N dimension designation・L dimension selection type


Non JIS material definition is listed on P.1351 - 1352

RoHS







Part Number	Head Thickness	T P
EDS EDSG	4mm(T4)	$^{0}_{-0.005}$
EDSE EDSEG		$^{-0.01}_{-0.02}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKD61 equivalent
H 50～55HRC
Range of guaranteed base material hardness (Details P.1303)

■ Standard

H	T	Part Number		L	P	N
		Type	D			
3	4	EDS ($P^{0}_{-0.005}$) EDSE ($P^{-0.01}_{-0.02}$)	1.5	100	0.6 0.8 1.0 1.2	40 50
				150		60 70
4			2	100	0.8 1.0 1.2 1.5	40 50
				150		60 70
				200		70 100
5			2.5	100	1.0 1.2 1.5 2.0	50
				150		60 70
				200		100
6			3	100	1.5 2.0	40 50
				150		60 70
				200		70 100
7			4	150	2.0 2.5	50
				200		100
				250		160

■ P・N dimension designation・L dimension selection type

H	T	Part Number		L Selection	P 0.01mm increments	N 1mm increments
		Type	D			
3	4	EDSG ($P^{0}_{-0.005}$) EDSEG ($P^{-0.01}_{-0.02}$)	1.5	100 150 200	0.60 ～1.40	N≧15 and 15≦(L−N)≦150
4			2		0.80 ～1.90	
5			2.5		0.80 ～2.40	
6			3	100 150 200 250 300	1.00 ～2.90	N≧15 and 20≦(L−N)≦200
7			3.5		1.50 ～3.40	
			4		1.50 ～3.90	

Order

Part Number	—	L	—	P	—	N
EDS 2	—	150	—	P1.0	—	N70
EDSE 4	—	150	—	P2.0	—	N50
EDSEG 4	—	250	—	P2.80	—	N60

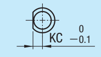
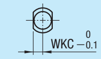
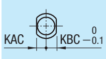
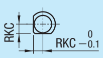
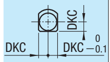
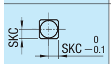
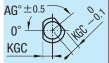
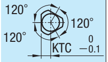
Days to Ship **Quotation**

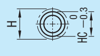
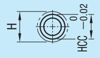
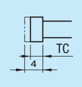
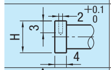
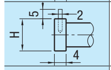
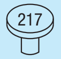
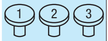
Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC···etc.)
EDS 3	—	150	—	P1.5	—	N60	—	NC
EDSEG 4	—	250	—	P2.80	—	N60	—	NC

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3 Available only for EDSG, EDSEG	
	TC	TC=0.1mm increments 2.0≦TC<4 EDS, EDSE ···▸ Dimensions L and N become shorter by (4−TC). EDSG, EDSEG ···▸ Dimension L becomes shorter by (4−TC) Dimensions N remains unchanged.	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	

Price **Quotation**

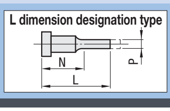
Stepped Ejector Pins

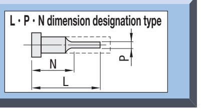
Dies Steel
SKD61 equivalent

Dies Steel
SKD61 equivalent
4mm head

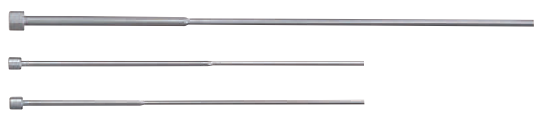
STEPPED EJECTOR PINS

— L DIMENSION DESIGNATION TYPE ／ L・P・N DIMENSION DESIGNATION TYPE —

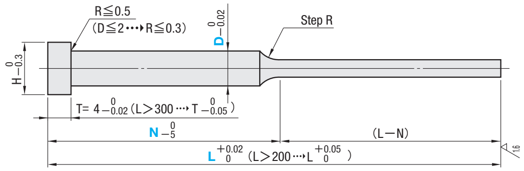


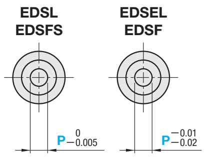


Non JIS material definition is listed on P.1351 - 1352



RoHS


R≦0.5
(D≦2···▸R≦0.3)
$D^{0}_{-0.02}$
Step R
$H^{0}_{-0.3}$
$T=4^{0}_{-0.02}$ (L>300···$T^{0}_{-0.05}$)
N^{0}_{-5}
(L−N)
$L^{+0.02}_{0}$ (L>200···$L^{+0.05}_{0}$)
1.6



Part Number	Type	Head Thickness	T P
EDSL	L dimension designation type	4mm(T4)	$^{0}_{-0.005}$
EDSFS	L・P・N dimension designation type		
EDSEL	L dimension designation type		$^{-0.01}_{-0.02}$
EDSF	L・P・N dimension designation type		

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)

M SKD61 equivalent
H 50～55HRC
Range of guaranteed base material hardness (Details **P.1303**)

■L dimension designation type

H	T	Part Number Type	D	L 0.01mm increments	P							N					
3	4	**EDSL** ($P^{0}_{-0.005}$) **EDSEL** ($P^{-0.01}_{-0.02}$)	1.5	50.00 ～ 100.00	0.6	0.8	1.0	1.2				40	50				
				100.01 ～ 150.00										60	70		
4			2	50.00 ～ 100.00		0.8	1.0	1.2	1.5			40	50				
				100.01 ～ 150.00										60	70		
				150.01 ～ 200.00											70	100	
5			2.5	60.00 ～ 100.00			1.0	1.2	1.5	2.0			50				
				100.01 ～ 150.00										60	70		
				150.01 ～ 200.00												100	
6			3	60.00 ～ 100.00					1.5	2.0		40	50				
				100.01 ～ 150.00										60	70		
				150.01 ～ 200.00											70	100	
7			4	100.00 ～ 150.00						2.0	2.5		50				
				150.01 ～ 200.00												100	
				200.01 ～ 250.00													160

L−N≧10

■L・P・N dimension designation type

H	T	Part Number Type	D	0.01mm increments L	0.01mm increments P	1mm increments N
3	4	**EDSFS** ($P^{0}_{-0.005}$) **EDSF** ($P^{-0.01}_{-0.02}$)	1.5	40.00～200.00	0.60 ～ 1.40	N≧15 and 15≦(L−N)≦150
4			2		0.80 ～ 1.90	
5			2.5		0.80 ～ 2.40	
6			3	40.00～300.00	1.00 ～ 2.90	N≧15 and 20≦(L−N)≦200
7			3.5		1.50 ～ 3.40	
			4		1.50 ～ 3.90	
8			4.5		2.50 ～ 4.40	
			5	40.00～500.00	3.00 ～ 4.90	
9			5.5		3.50 ～ 5.40	
			6		4.00 ～ 5.90	
10			6.5		4.50 ～ 6.40	
			7		4.90 ～ 6.90	
11			8		5.90 ～ 7.90	
14			9		6.90 ～ 8.90	
15			10		7.90 ～ 9.90	
17			12		8.90 ～ 11.90	
18			13		9.90 ～ 12.90	

Order

Part Number		L		P		N
EDSL 2.5	—	149.78	—	P1.5	—	N70
EDSEL 4	—	223.70	—	P2.0	—	N160
EDSF 4	—	240.30	—	P2.80	—	N60

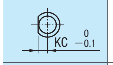
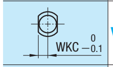
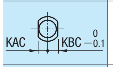
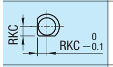
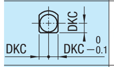
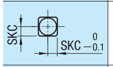
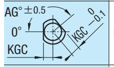
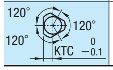
Days to Ship **Quotation**

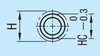
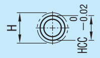
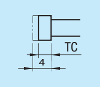
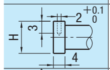
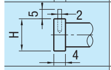
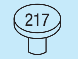
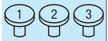
Alterations

Part Number		L		P		N		(KC・WKC···etc.)
EDSL 2	—	149.78	—	P1.5	—	N70	—	NCW
EDSF 4	—	240.30	—	P2.80	—	N60	—	NC

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting D/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
	**DKC**	Three flats cutting D/2≦DKC<H/2		
	**SKC**	Four flats cutting D/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

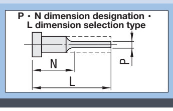
Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments D+1≦HC<H	Quotation
	**HCC**	HCC=0.1mm increments D+1≦HCC<H− Available only for EDSFS,EDSF	
	**TC**	TC=0.1mm increments 2.0≦TC<4 4−TC≦Lmax.−L EDSL,EDSEL ···▸ Dimension L remains unchanged Dimensions N becomes shorter by (4−TC). EDSFS,EDSF ···▸ Dimensions L and N remain unchanged.	
	**NC**	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
	**NCW**	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available.	
	**NHC**	Numbering on the head How to order **P.128** ⊗ Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order **P.128** ⊗ Combination with SKC not available.	

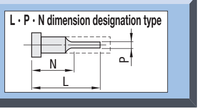
Price **Quotation**

Prehardened
Dies Steel
SKD61 equivalent

STEPPED EJECTOR PINS

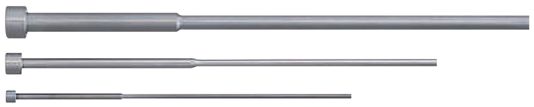
— P・N DIMENSION DESIGNATION・L DIMENSION SELECTION TYPE ／ L・P・N DIMENSION DESIGNATION TYPE —

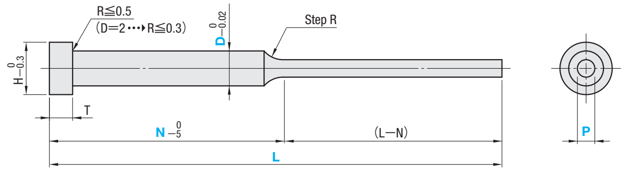




Non JIS material definition is listed on P.1351 - 1352

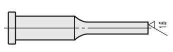
RoHS





Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKD61 equivalent (Prehardened)
H 40～45HRC
Range of guaranteed base material hardness (Details P.1303)

Part Number	Type	Head Thickness	T T	T L	T P	Tip Face Roughness
EASG	P・N dimension designation・L dimension selection type	4mm (T4)	$^{0}_{-0.02}$(L>300 ··· T$^{0}_{-0.05}$)	$^{+5}_{+0.1}$	$^{-0.01}_{-0.02}$	—
EASF	L・P・N dimension designation type			$^{+0.02}_{0}$(200<L≦500 ··· L$^{+0.05}_{0}$ L>500 ··· L$^{+0.5}_{0}$)	L \ D: 2～8, 10～20 L≦500: $^{-0.01}_{-0.02}$, $^{-0.01}_{-0.03}$ L>500: $^{-0.01}_{-0.03}$, $^{-0.01}_{-0.04}$	 1.6
EAJSF		6・8mm (JIS)	$^{0}_{-0.05}$			

■P・N dimension designation・L dimension selection type

4mm head		Part Number		L	P	N
H	T	Type	D	Selection	0.01mm increments	1mm increments
4	4	**EASG**	2	100 150 200 250 300	0.80 ～ 1.90	N≧15 and 15≦(L−N)≦150
5			2.5		0.80 ～ 2.40	
6			3	100 150 200 250 300 400	1.00 ～ 2.90	N≧15 and 20≦(L−N)≦200
7			3.5		1.50 ～ 3.40	
			4		1.50 ～ 3.90	

■L・P・N dimension designation type

4mm head		JIS head		Part Number			L	P	N
H	T	H	T	Type: 4mm head	Type: JIS head	D	0.01mm increments (L>500 ··· 0.1mm increments)	0.01mm increments	1mm increments
4	4	—	—	**EASF**	—	2	40.00 ～ 300.00	0.80 ～ 1.90	N≧15 and 15≦(L−N)≦150
5						2.5		0.80 ～ 2.40	
6						3	40.00 ～ 400.00	1.00 ～ 2.90	・N≧15 (T4) and 20≦(L−N)≦200 ・N≧$\frac{L}{3}$ (JIS) and (L−N)≧10
7						3.5		1.50 ～ 3.40	
		8	6		**EAJSF**	4	40.00 ～ 400.00 (50.00 ～ 500.00)	1.50 ～ 3.90	
8						4.5		2.50 ～ 4.40	
		9				5	40.00～ 500.00(50.00～600.0)	3.00 ～ 4.90	
9						5.5	40.00～ 500.00(50.00～500.00)	3.50 ～ 5.40	
		10				6	40.00 ～ 500.00 (50.00 ～ 700.0)	4.00 ～ 5.90	
10		11				6.5		4.50 ～ 6.40	
						7	40.00 ～ 500.00 (50.00 ～ 800.0)	4.90 ～ 6.90	
11		13	8			8		5.90 ～ 7.90	
15		15				10		7.90 ～ 9.90	
17		17				12		8.90 ～ 11.90	
—	—	20		—		15	50.00 ～ 800.0	10.90 ～ 14.90	
		21				16		11.90 ～ 15.90	
		25				20		15.90 ～ 19.90	

The figure in ( ) for L dimension is for EAJSF only.
For less D4 head thickness JIS type is T=4, please place the order for head 4mm type EASF.

Order

Part Number	—	L	—	P	—	N
EASG2	—	150	—	P1.90	—	N50
EAJSF10	—	720.5	—	P9.00	—	N300

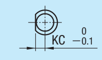
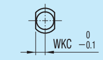
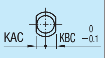
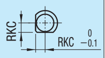
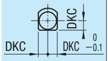
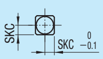
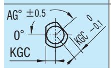
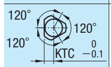
Days to Ship **Quotation**

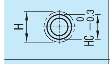
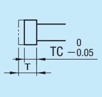
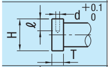
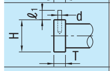
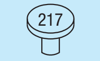
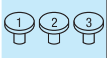
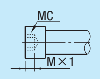
Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC···etc.)
EASG 2	—	150	—	P1.90	—	N50	—	SKC1.0
EAJSF 10	—	720.5	—	P9.00	—	N300	—	SKC7.0

Quotation

Alteration details P.127

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting D/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
	**DKC**	Three flats cutting D/2≦DKC<H/2		
	**SKC**	Four flats cutting D/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments D+1≦HC<H	
	**TC**	TC=0.1mm increments T/2≦TC<T EASG ··· Dimension L becomes shorter by (T−TC). Dimensions N remains unchanged. EASF, EAJSF ··· T−TC≦Lmax.−L (Lmax. remains unchanged.)	
	**NC**	Dowel hole boring ⊗ Combination with other than NHC・NHN not available. T / d / ℓ: 4 / 2 / 3; 6・8 / 3 / 5	Quotation
	**NCW**	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN not available. T / d / ℓ1: 4 / 2 / 5; 6・8 / 3 / 5	
	**NHC**	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	**MC**	Head tapping Available for EAJSF when D≧8, H≧13, T=8 ⊗ Combination with any other alteration not available. D / M: 8 / M4; 10 / M5; 12・15 / M6; 16・20 / M8	

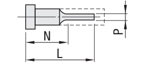
Price **Quotation**

Stainless Steel
SUS440C

STEPPED EJECTOR PINS

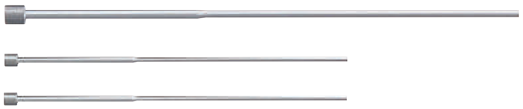
— L・P・N DIMENSION DESIGNATION TYPE —

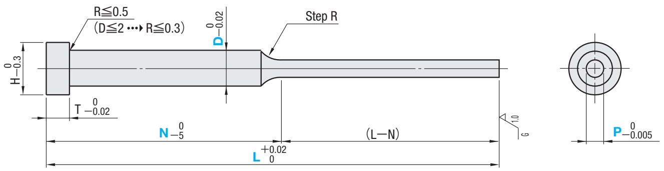
L・P・N dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Head Thickness	T P
EWSF	4mm(T4)	0 −0.005
EWSJF	6mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SUS 440C
H 56～60HRC
Range of guaranteed base material hardness (Details P.1303)

4mm head		JIS head		Part Number			0.01mm increments		1mm increments
				Type					
H	T	H	T	4mm head	JIS head	D	L	P	N
3	4	—	—	EWSF	—	1.5	40.00～ 200.00 (50.00)	0.60 ～ 1.40	N≧15 and 15 ≦(L−N)≦150
4						2		0.80 ～ 1.90	
5						2.5		0.80 ～ 2.40	
6						3		1.00 ～ 2.90	・N≧15(T4) ・N≧30(JIS) and 20≦(L−N)≦150
7						3.5		1.50 ～ 3.40	
		8	6		EWSJF	4		1.50 ～ 3.90	
8						4.5		2.50 ～ 4.40	
		9				5		3.00 ～ 4.90	
9						5.5		3.50 ～ 5.40	
		10				6		4.00 ～ 5.90	

The figures in ( ) for L dimension is for EWSJF only.
For less D4 head thickness JIS type is T=4, please place the order for head 4mm type EWSF.

Order	Part Number	—	L	—	P	—	N
	EWSJF 5	—	185.00	—	P3.00	—	N130

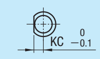
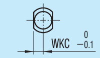
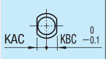
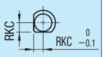
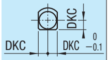
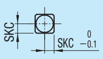
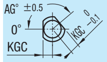
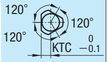
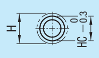
Days to Ship **Quotation**

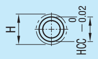
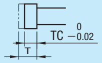
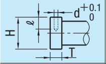
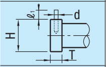
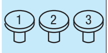
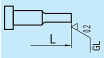
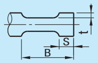
Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC···etc.)
EWSJF 4	—	180.00	—	P3.85	—	N50	—	SKC2.0

Quotation

Alteration details P.127

Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	
	HC	HC=0.1mm increments D+1≦HC<H	

Alterations	Code	Spec.	1Code
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	Quotation
	TC	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged.) T−TC≦Lmax.−L	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T d ℓ / 4 2 3 / 6 3 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・TMC・GVC not available. T d ℓ1 / 4 2 5 / 6 3 5	
	NHC	Numbering on the head How to order P.128 Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 Combination with SKC not available.	
	TMC	Lapping on the tip face	
	GVC	S, B=1mm increments 2≦S≦10, S+5≦B≦30 Available when P≧3	

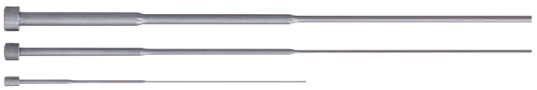
Price **Quotation**

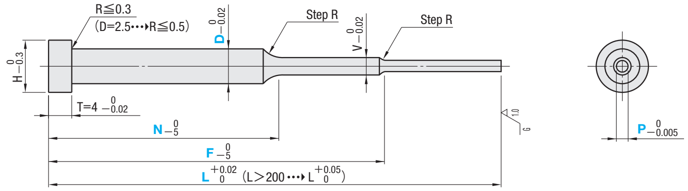
High Speed Steel
SKH51 equivalent
4mm head

TWO-STEPPED EJECTOR PINS

Non JIS material definition is listed on P.1351 - 1352

RoHS





Part Number	Head Thickness
EHWSB	4mm(T4)

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

H	T	V	Part Number		0.01mm increments		1mm increments	
			Type	D	L	P	N	F
3	4	0.6	EHWSB	1	50.00 ～ 100.00	0.30 ～ 0.50	15 ～ 50	15≦(F−N)≦50
3		1		1.5	50.00 ～ 100.00	0.30 ～ 0.59		
					50.00 ～ 150.00	0.60 ～ 0.90	15 ～ 100	15≦(F−N)≦100
4		1.5		2	50.00 ～ 200.00	0.60 ～ 1.40	15 ～ 150	15≦(F−N)≦125
5		2		2.5	50.00 ～ 250.00	0.60 ～ 1.90	15 ～ 200	15≦(F−N)≦125

L−N≦140 15≦(L−F)≦100×P

Order

Part Number	—	L	—	P	—	N	—	F
EHWSB 2	—	120.40	—	P0.86	—	N40	—	F80

Days to Ship Quotation

■Characteristics

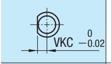
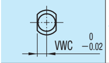
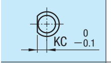
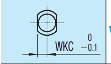
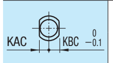
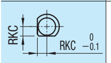
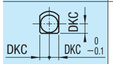
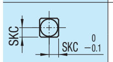
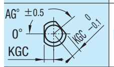
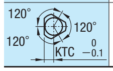
- Two-stepping enables production of lengthy pins with small tip diameter.

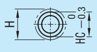
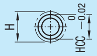
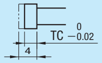
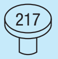
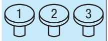
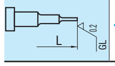
(Example :Maximum full length 100mm for tip diameter : 0.3mm
Maximum full length 250mm for tip diameter : 0.6mm)

Alterations

Part Number	—	L	—	P	—	N	—	F	—	(KC・WKC···etc.)
EHWSB 2	—	120.40	—	P0.86	—	N40	—	F80	—	TMC

Alteration details P.127

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two parallel flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments 2.0≦TC<4, D≧1.5 (Dimensions L, F and N remain unchanged.) 4−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.128 ⊗ Combination with SKC not available.	
	TMC	Lapping on the tip face Available when P≧0.6	

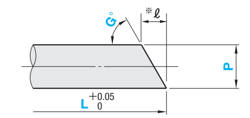
Price Quotation

SHAPE VARIATIONS OF STEPPED EJECTOR PINS WITH TIP PROCESS ①

—SHAPES 1A～20A—

Shapes 21A～32A
P.165・166

1A (Bezel・Angle designation)

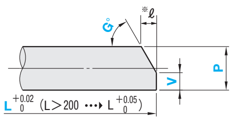


※ℓ calculation

$\ell = \frac{P}{\tan G}$

- $45^\circ \leqq G < 90^\circ$

2A (Partial bezel・Angle designation)

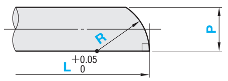

G°
※ℓ
P
V
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

※ℓ calculation

$\ell = \frac{P-V}{\tan G}$

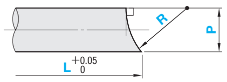
- $45^\circ \leqq G < 90^\circ$
- $1.5 \leqq V < P$

3A (Outward R)



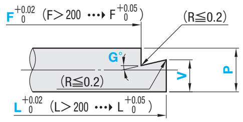
- $P \leqq R \leqq 15$

4A (Inward R)



- $P \leqq R \leqq 15$

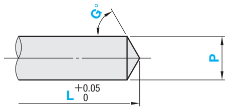
5A (Z groove)


F +0.02 0 (F＞200 ･･･▸ F +0.05 0)
(R≦0.2)
G°
(R≦0.2)
V
P
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

- $0^\circ \leqq G \leqq 45^\circ$
- $1.5 \leqq V < P$
- $L-F \leqq 10$
- $V-(L-F)\tan G \geqq 1$

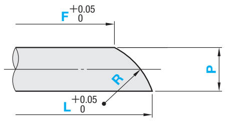
⊗ R designation not available.

6A (Cone)



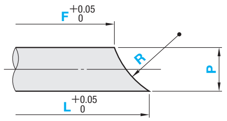
- $45^\circ \leqq G < 90^\circ$

7A (Outward R with F designation)


F +0.05 0
R
P
L +0.05 0

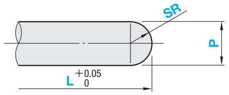
- $L-F \leqq P \leqq 15$

8A (Inward R with F designation)


F +0.05 0
R
P
L +0.05 0

- $P < R \leqq 15$
- $L-F > R-\sqrt{R^2-P^2}$

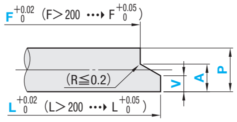
9A (Spherical surface)



- Default: $SR = \frac{P}{2}$

SR may be designated within
- $\frac{P}{2} < SR \leqq 2P$ range.

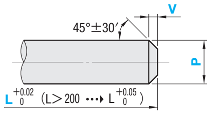
10A (Trapezoid)


F +0.02 0 (F＞200 ･･･▸ F +0.05 0)
(R≦0.2)
V
A
P
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

- $1.5 \leqq V < P$
- $V \leqq A < P$
- $L-F \leqq 5$

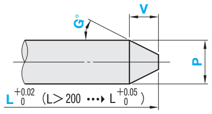
⊗ R designation not available.

11A (C chamfered)


45°±30′
V
P
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

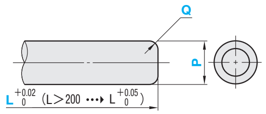
- $0.1 \leqq V \leqq \left(\frac{P}{2}-0.1\right)$

12A (Tapered)


G°
V
P
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

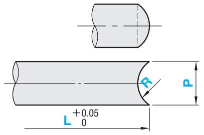
- $0.1 \leqq V \leqq (P \times 2),\ \frac{P}{2}-V\tan G \geqq 0.1$
- $0^\circ < G \leqq 45^\circ$

13A (R chamfered)


Q
P
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

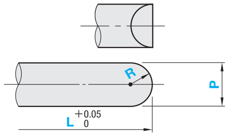
- $0.2 \leqq Q \leqq \left(\frac{P}{2}-0.1\right)$

14A (R groove)



- $(P \times 1.2) \leqq R \leqq (P \times 2)$

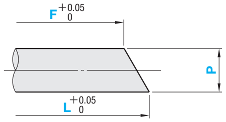
15A (R surface)



- Default: $R = \frac{P}{2}$

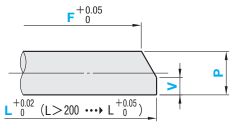
R may be designated within
- $\frac{P}{2} < R \leqq 2P$ range.

16A (Bezel・F designation)


F +0.05 0
P
L +0.05 0

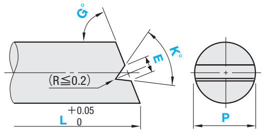
- $0.05 \leqq (L-F) \leqq P$

17A (Partial bezel with F designation)


F +0.05 0
V
P
L +0.02 0 (L＞200 ･･･▸ L +0.05 0)

- $0.05 \leqq (L-F) \leqq (P-V)$
- $1.5 \leqq V < P$

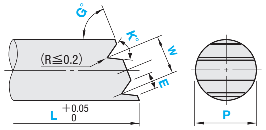
18A (Bezel＋1 groove)


G°
K°
E
(R≦0.2)
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq E \leqq 3.0$
- $E \leqq \frac{P}{2}$
- K Selection 60° or 90°

⊗ R designation not available.

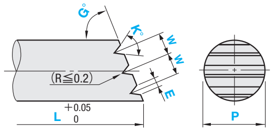
19A (Bezel＋2 grooves)


G°
K°
W
E
(R≦0.2)
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq E \leqq 3.0$
- $E \leqq \frac{P}{3}$
- $(E+0.2) \leqq W \leqq (P-E-0.4)$
- K Selection 60° or 90°

⊗ R designation not available.

20A (Bezel＋3 grooves)


G°
K°
W
W
E
(R≦0.2)
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq E \leqq 3.0$
- $E \leqq \frac{P}{4}$
- $(E+0.2) \leqq W \leqq \left(P-\frac{E}{2}-0.2\right)$
- K Selection 60° or 90°

⊗ R designation not available.

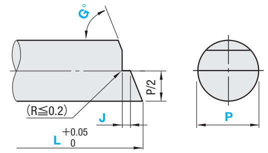
SHAPE VARIATIONS OF STEPPED EJECTOR PINS WITH TIP PROCESS ②

—SHAPES 21A～32A—

Shapes 1A～20A
P.163・164

Non JIS material definition is listed on P.1351 - 1352

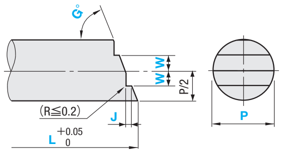
21A (Bezel＋1 vertical groove)


G°
(R≦0.2)
J
L +0.05 0
P/2
P

- $45^\circ \leqq G < 90^\circ$
- $J \leqq \frac{P}{3\tan G}$
- $0.3 \leqq J \leqq 3.0$

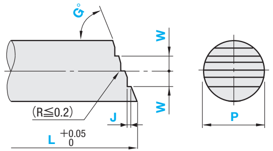
⊗ R designation not available.

22A (Bezel＋2 vertical grooves)


G°
W
W
P/2
(R≦0.2)
J
L +0.05 0
P

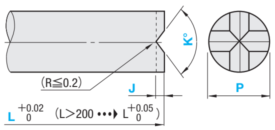
- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq J \leqq 3.0$
- $J \leqq \frac{P}{4\tan G}$
- $0.1 + J\tan G \leqq W \leqq (\frac{P}{2} - 0.2)$

23A (Bezel＋3 vertical grooves)

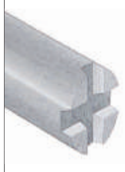

G°
W
W
(R≦0.2)
J
L +0.05 0
P

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq J \leqq 3.0$
- $J \leqq \frac{P}{5\tan G}$
- $0.1 + J\tan G \leqq W \leqq (\frac{P}{2} - 0.2)$

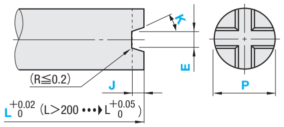
24A (Cross groove・Triangle shaped)


K°
(R≦0.2)
J
P
L +0.02 0 (L>200 ••• L +0.05 0)

- $0.3 \leqq J \leqq 3.0$
- $J \leqq \frac{P}{3}$
- $30^\circ \leqq K^\circ \leqq 90^\circ$ (5° increments)

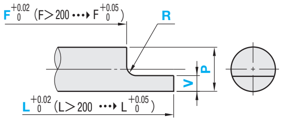


25A (Cross groove・Trapezoid-shaped)


K
E
(R≦0.2)
J
P
L +0.02 0 (L>200 ••• L +0.05 0)

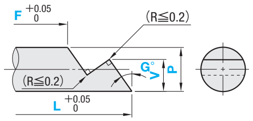
- $0.3 \leqq J \leqq 3.0$
- $0.3 \leqq E \leqq 3.0$
- $J \leqq \frac{P}{3}$
- $E \leqq \frac{P}{3}$
- $0^\circ \leqq K^\circ \leqq 45^\circ$ (5° increments)

26A (L-shaped・R designation)


F +0.02 0 (F>200 ••• F +0.05 0)
R
P
V
L +0.02 0 (L>200 ••• L +0.05 0)

- $0.3 \leqq R \leqq (P - V)$ and $R \leqq (L - F)$
- $0.2 \leqq (L - F) \leqq (V \times 5)$
- $1 \leqq V < P$

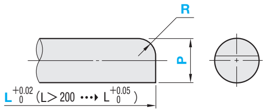
27A (Bezel・Z groove)


F +0.05 0
(R≦0.2)
(R≦0.2)
G°
V
P
L +0.05 0

- $1 \leqq (L - F) \leqq (V \times 5)$
- $0^\circ < G \leqq 45^\circ$
- $1.5 \leqq V < P$

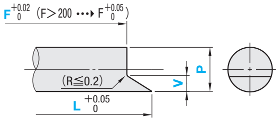
⊗ R designation not available.

28A (Half R)


R
P
L +0.02 0 (L>200 ••• L +0.05 0)

- $(P \times 0.1) \leqq R < (P \times 0.8)$

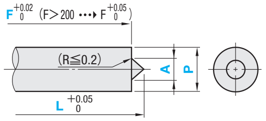
29A (L-shaped・Tapered)


F +0.02 0 (F>200 ••• F +0.05 0)
(R≦0.2)
V
P
L +0.05 0

- $0.2 \leqq (L - F) \leqq V \times 5$
- $0.3 \leqq V < P$

⊗ R designation not available.

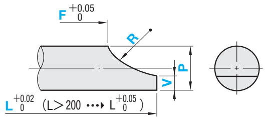
30A (Umbo)


F +0.02 0 (F>200 ••• F +0.05 0)
(R≦0.2)
A
P
L +0.05 0

- $1 \leqq A \leqq (P - 1)$ and $\frac{P}{3} \leqq A$
- $1 \leqq (L - F) \leqq (A \times 3)$

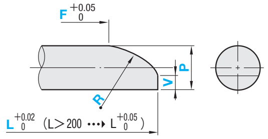
⊗ R designation not available.

31A (Inward R with F/V designation)


F +0.05 0
R
V
P
L +0.02 0 (L>200 ••• L +0.05 0)

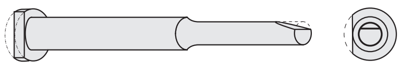
- $P < R \leqq 15$
- $L - F > R - \sqrt{R^2 - (P - V)^2}$
- $1.5 \leqq V < P$

32A (Outward R with F/V designation)

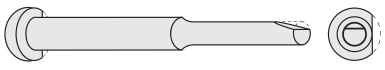

F +0.05 0
R
V
P
L +0.02 0 (L>200 ••• L +0.05 0)

- $P < R \leqq 15$
- $L - F > R - \sqrt{R^2 - (P - V)^2}$
- $1.5 \leqq V < P$

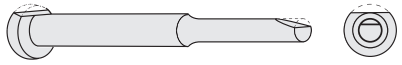
■Flats cutting position for 2A shape



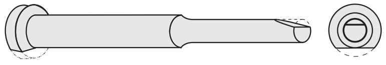
AKC0



AKC180

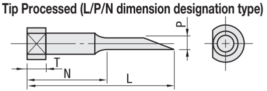


AKC90



AKC270

■Products list

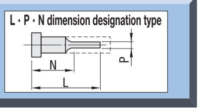
Classification \ Shape			Tip Processed (L/P/N dimension designation type) 	
Material	**Head Thickness (T)**	**Tip diameter (P) tolerance**	**Part Number**	**Page**
SKH51 equivalent	4mm (T4)	0 −0.005	EHSF□A	P.167
		−0.01 −0.02	EHSFE□A	
	6・8mm (JIS)	0 −0.005	EHSJF□A	
		−0.01 −0.02	EHSJFE□A	

■Unit of designation

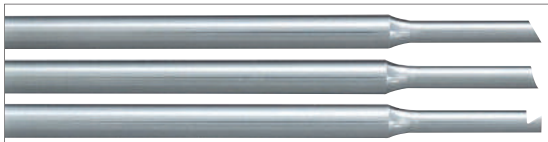
T	Unit of designation
G±30′	1° increments
K±30′	Select 60° or 90° for 18A,19A and 20A. 24A・25A 5° increments
R±0.02 (15A Shape・26A Shape ···› R±0.1)	0.1mm increments
SR±0.1	0.1mm increments
A±0.05	0.1mm increments
V±0.05	0.1mm increments
E±0.02	0.1mm increments
J±0.02	0.1mm increments
W±0.02	0.1mm increments
Q±0.1	0.1mm increments
F (For tolerance, refer to the drawing)	0.01mm increments

High Speed Steel
SKH51
equivalent

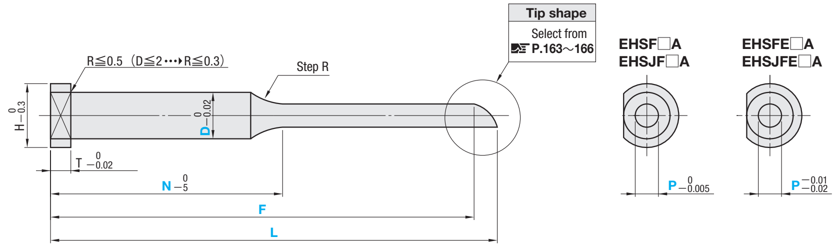
STEPPED EJECTOR PINS WITH TIP PROCESS



Non JIS material definition is listed on P.1351 - 1352



RoHS



Tip shape
Select from P.163～166

To determine the engraving position, key flat cutting is made at the standard 0°

Part Number	Head Thickness	T P
EHSF□A	4mm(T4)	$_{-0.005}^{0}$
EHSJF□A	6・8mm(JIS)	
EHSFE□A	4mm(T4)	$_{-0.02}^{-0.01}$
EHSJFE□A	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details **P.1303**)

4mm head		JIS head		Part Number				0.01mm increments		1mm increments
				Type		Tip shape	D	L	P	N
H	T	H	T	4mm head	JIS head					
4	4	—	—	**EHSF** ($P_{-0.005}^{0}$) **EHSFE** ($P_{-0.02}^{-0.01}$)	—	1A 17A 2A 18A 3A 19A 4A 20A 5A 21A 6A 22A 7A 23A 8A 24A 9A 25A 10A 26A 11A 27A 12A 28A 13A 29A 14A 30A 15A 31A 16A 32A	2	50.00～250.00	1.50 ～ 1.90	N≧15 and 15≦(L−N)≦200
5							2.5		1.50 ～ 2.40	
6							3	50.00～300.00	1.50 ～ 2.90	・N≧15(T4) ・N≧30(JIS) and 20≦(L−N)≦200
7							3.5		1.50 ～ 3.40	
		8	6		**EHSJF** ($P_{-0.005}^{0}$) **EHSJFE** ($P_{-0.02}^{-0.01}$)		4		2.00 ～ 3.90	
8							4.5		2.50 ～ 4.40	
		9					5	50.00～350.00	3.00 ～ 4.90	
9							5.5		3.50 ～ 5.40	
		10					6		4.00 ～ 5.90	
10		11					6.5		4.50 ～ 6.40	
							7		5.00 ～ 6.90	
11		13	8				8		6.00 ～ 7.90	
14		14					9		7.00 ～ 8.90	
15		15					10		7.90 ～ 9.90	
17		17					12		8.90 ～11.90	

Select a tip shape **1A～32A** **P.163～166**
For head thickness JIS less than D4 is T=4, please place the order for head thickness 4mm type of EHSF□A ($P_{-0.005}^{0}$), EHSFE□A ($P_{-0.02}^{-0.01}$).

Order	Part Number (Type, Tip shape, D)	—	L	—	P	—	N	—	In order of A・V・E・J・W・R・SR・F・G・K・Q
	EHSF 8A 6	—	140.00	—	P5.30	—	N80	—	R10 — F130.00

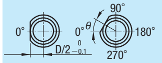
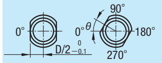
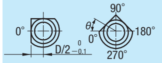
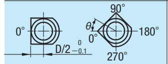
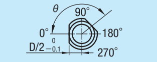
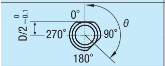
Days to Ship **Quotation**

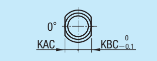
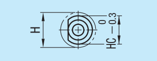
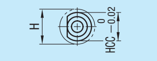
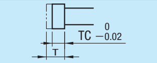
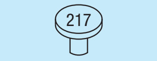
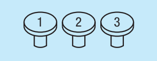
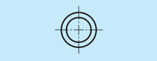
Alterations

Part Number	—	L	—	P	—	N	—	A,V,E,J,W,R,SR,F,G,K,Q	—	(AKC・AWC…etc.)
EHSF8A 6	—	140.00	—	P5.30	—	N80	—	R10 — F130.00	—	AWC60

Quotation

Alteration details **P.127**

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0<AKC<360 No need to designate AKC0	
	**AWC**	AWC=1° increments 0≦AWC<360	
	**ARC**	ARC=1° increments 0≦ARC<360	Quotation
	**ADC**	ADC=1° increments 0≦ADC<360	
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGB**	KGB=1° increments 0<KGB<360	

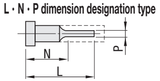
Alterations	Code	Spec.	1Code
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 Combination with other key flat cutting not available	
	**HC**	HC=0.1mm increments D+1≦HC<H	
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3	
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimensions L, F and N remain unchanged.) T−TC≦Lmax.−L	Quotation
	**NHC**	Numbering on the head How to order **P.128**	
	**NHN**	Automatic sequential numbering on the head How to order **P.128**	
	**NKC**	Without key flat cutting Available for tip shapes 6A・9A・11A・12A・13A・30A Combination only with HC・HCC・TC・NHC・NHN available.	

Price **Quotation**

High Speed Steel
SKH51
equivalent

STEPPED EJECTOR PINS WITH ENGRAVING

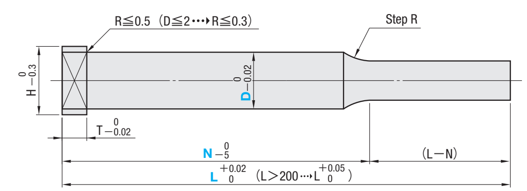
— L・P・N DIMENSION DESIGNATION TYPE —

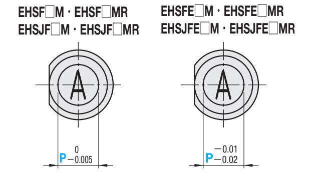


Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number		Head Thickness	T P
Type	Character		
EHSF	□M □MR	4mm(T4)	0 −0.005
EHSJF		6・8mm(JIS)	
EHSFE		4mm(T4)	−0.01 −0.02
EHSJFE		6・8mm(JIS)	

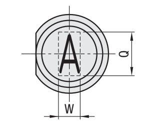
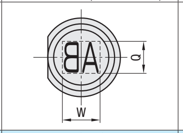
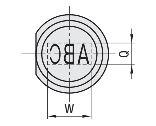
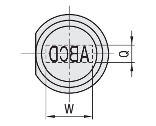
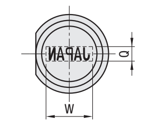




※ Range of guaranteed shaft diameter precision (D) (Details P.1301)
※ Step R (Details P.1302)

To determine the engraving position,key flat cutting is made at the standard 0°.

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
				
0.30≦P≦11.90	1.50≦P≦11.90	2.80≦P≦11.90	3.60≦P≦11.90	4.50≦P≦11.90

Please place order by the character order of molding products. Refer to P.118 for character font.

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Character	D	0.01mm increments L	0.01mm increments P	1mm increments N
3	4	—	—	EHSF (P$^{\ 0}_{-0.005}$) EHSFE (P$^{-0.01}_{-0.02}$)	—	1M 2M 3M 4M 5M (Sequential numbering designation) 1MR 2MR	1	40.00～100.00	0.30 ～ 0.90	N≧15 and 15≦(L−N)≦100
								100.01～150.00	0.60 ～ 0.90	
							1.5	40.00～200.00	0.60 ～ 1.40	N≧15 and 15≦(L−N)≦150
4							2	40.00～250.00 (50.00)	0.80 ～ 1.90	
5							2.5		0.80 ～ 2.40	
6							3		1.00 ～ 2.90	・N≧15 (T4) ・N≧30 (JIS) and 20≦(L−N)≦200
7							3.5		1.50 ～ 3.40	
		8	6		EHSJF (P$^{\ 0}_{-0.005}$) EHSJFE (P$^{-0.01}_{-0.02}$)		4		1.50 ～ 3.90	
8							4.5		2.50 ～ 4.40	
		9					5		3.00 ～ 4.90	
9							5.5		3.50 ～ 5.40	
		10					6		4.00 ～ 5.90	
10		11					6.5		4.50 ～ 6.40	
							7		4.90 ～ 6.90	
11		13	8				8		5.90 ～ 7.90	
14		14					9		6.90 ～ 8.90	
15		15					10		7.90 ～ 9.90	
17		17					12		8.90 ～11.90	

Characters for engraving (Round Gothic type)

0 1 2 3 4
5 6 7 8 9
A B C D E
F G H I J
K L M N O
P Q R S T
U V W X Y
Z

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%
Centered dot	・	@
Period	.	&

- Use ¥ for indicating/(slash), # for -(minus), % for ⬚ (space), @ for ・ (centered dot), and & for.(period).
- The figure in ( ) for L dimension are applicable for EHSJF□M・EHSJFE□M only.
- For head thickness JIS less than D4 is T＝4, please place the order for head thickness 4mm type of EHSF□M (P$^{\ 0}_{-0.005}$) EHSFE□M (P$^{-0.01}_{-0.02}$).
- 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
- In case of 1MR,"0" is next to "9" while "A" is next to "Z".
- In case of 2MR, the 1st digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the 2nd digit is increased by one.
- ⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.
- When placing the order for 5 pieces of EHSF1MR2—150—P1.5—1, characters for engraving"1 2 3 4 5"
- When placing the order for 3 pieces of EHSF1MR3—150—P2.0—Z, characters for engraving "Z A B"
- When placing the order for 4 pieces of EHSF2MR4—100—P2.5—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of EHSF2MR4—100—P2.5—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of EHSF2MR6—150—P4.5—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

Order

Part Number				L		P		N		Characters for engraving (0～9, A～Z ／＞＜＋—⬚・.)
Type	Character	D	—		—		—		—	
EHSJF	3M	5	—	250.00	—	P4.50	—	N130	—	DEF

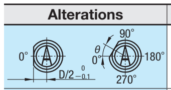
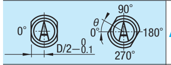
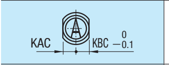
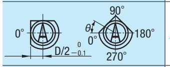
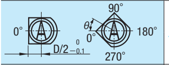
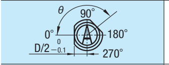
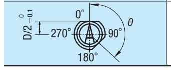
Days to Ship Quotation

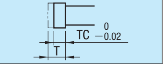
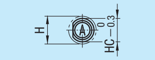
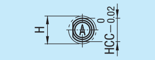
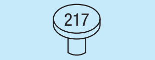
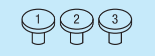
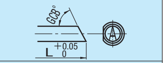
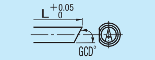
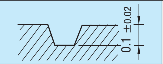
Alterations

Part Number	—	L	—	P	—	N	—	Characters for engraving (0～9, A～Z,／＞＜＋—⬚・.)	—	(AKC・AWC⋯etc.)
EHSJF3M 5	—	250.00	—	P4.50	—	N130	—	DEF	—	AWC45

Quotation

Alteration details P.127

Alterations	Code	Spec.	1Code
	AKC	AKC＝1° increments 0＜AKC＜360 When combined with GCB/GCD, 90° increments only No need to designate AKC0	
	AWC	AWC＝1° increments 0≦AWC＜360 When combined with GCB/GCD, 90° increments only	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC＜H/2 KBC＝0.1mm increments only KAC＜KBC＜H/2 ⊗ Combination with other key flat cutting not available	Quotation
	ARC	ARC＝1° increments 0≦ARC＜360 When combined with GCB/GCD, 90° increments only	
	ADC	ADC＝1° increments 0≦ADC＜360 When combined with GCB/GCD, 90° increments only	
	KGA	KGA＝1° increments 0＜KGA＜360	
	KGB	KGB＝1° increments 0＜KGB＜360	

Alterations	Code	Spec.	1Code
	TC	TC＝0.1mm increments T/2≦TC＜T, D≧1.5 (Dimensions L and N remain unchanged.) T—TC≦Lmax.—L	
	HC	HC＝0.1mm increments D＋1≦HC＜H, D≧1.5	
	HCC	HCC＝0.1mm increments D＋1≦HCC＜H—0.3, D≧1.5	
	NHC	Numbering on the head How to order P.128	Quotation
	NHN	Automatic sequential numbering on the head How to order P.128	
	GCB	GCB＝1° increments 60≦GCB＜90 Available when L≦200, P≧2, D≧3 ⊗ Combination with GCD not available.	
	GCD	GCD＝1° increments 60≦GCD＜90 Available when L≦200, P≧2, D≧3 ⊗ Combination with GCB not available.	
	EC	Engraving depth alteration 0.05 ⋯▸ 0.1 Available when P≧1 ⊗ Combination with GCB, GCD not available.	

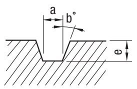
Price Quotation

■Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1M 1MR (1 character)	0.30 ～ 0.39	0.2	0.1
	0.40 ～ 0.49	0.25	0.13
	0.50 ～ 0.59	0.35	0.18
	0.60 ～ 0.79	0.4	0.2
	0.80 ～ 0.90	0.6	0.3
	1.00 ～ 1.29	0.8	0.4
	1.30 ～ 1.49	1.0	0.5
	1.50 ～ 1.99	1.2	0.6
	2.00 ～ 2.49	1.5	0.8
	2.50 ～ 3.49	2.0	1.0
	3.50 ～ 4.49	3.0	1.5
	4.50 ～ 5.49	4.0	2.0
	5.50 ～11.90	5.0	2.5
2M 2MR (2 characters)	1.50 ～ 1.90	0.7	1.1
	2.00 ～ 2.29	0.8	1.2
	2.30 ～ 2.99	1.0	1.3
	3.00 ～ 3.99	1.5	2.0
	4.00 ～ 4.99	2.0	2.6
	5.00 ～ 5.99	2.5	3.3
	6.00 ～ 7.99	3.0	3.9
	8.00 ～11.90	4.0	5.2
3M (3 characters)	2.80 ～ 3.09	0.8	1.8
	3.10 ～ 4.49	1.0	2.1
	4.50 ～ 5.49	1.5	3.2
	5.50 ～ 6.99	2.0	4.2
	7.00 ～11.90	2.5	5.3
4M (4 characters)	3.60 ～ 3.89	0.8	2.4
	3.90 ～ 5.49	1.0	2.9
	5.50 ～ 6.99	1.5	4.4
	7.00 ～11.90	2.0	5.8
5M (5 characters)	4.50 ～ 4.99	0.8	3.0
	5.00 ～ 6.99	1.0	3.7
	7.00 ～11.90	1.5	5.6

Ejector pins	Finished products
Reversed reading (Concave character)	Right reading (Convex character)

Engraving Details

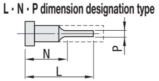


Width of engraving (a)	0.1×Q～0.2×Q
Angle of engraving (b°)	35° ± 2°
Depth of engraving (e)	When P≦0.9 0.03±0.01 When P≧1.0 0.05±0.02 When EC code is used 0.1 ± 0.02

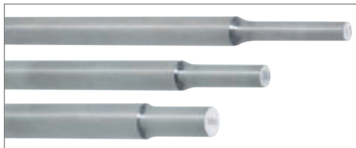
Dies Steel
SKD61 equivalent
+
Nitrided

STEPPED EJECTOR PINS WITH ENGRAVING

— L・P・N DIMENSION DESIGNATION TYPE —

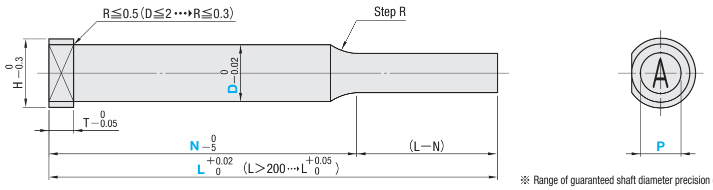


Non JIS material definition is listed on P.1351 - 1352



RoHS

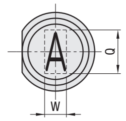
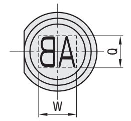
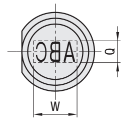
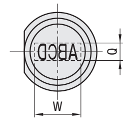
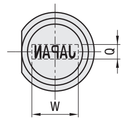
Part Number	Head Thickness	T	P 4≦D≦8	P 10≦D≦20
EJSF□M EJSF□MR	6・8mm(JIS)	0 −0.05	−0.01 −0.02	−0.01 −0.03



※ Range of guaranteed shaft diameter precision (D) (Details P.1301)
※ Step R (Details P.1302)

To determine the engraving position,key flat cutting is made at the standard 0° .

M SKD61 equivalent+Nitrided
H Surface900HV～Base material40～45HRC
Range of guaranteed base material hardness (Details P.1303)

1M・**1MR** (1 character)	**2M**・**2MR** (2 characters)	**3M** (3 characters)	**4M** (4 characters)	**5M** (5 characters)
				
1.50≦P≦19.90	1.50≦P≦19.90	2.80≦P≦19.90	3.60≦P≦19.90	4.50≦P≦19.90

Please place order by the character order of molding products.　Refer to P.118 for character font.

JIS head H	JIS head T	Part Number Type JIS head	Part Number Character	Part Number D	0.01mm increments L	0.01mm increments P	1mm increments N	Characters for engraving (Round Gothic type)
8	6	EJSF	1M 2M 3M 4M 5M (Sequential numbering designation) 1MR 2MR	4	50.00～300.00	1.50～ 3.90	・N≧L/3 and (L−N)≧10	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
				4.5		2.50～ 4.40		
9				5		3.00～ 4.90		
				5.5		3.50～ 5.40		
10				6		4.00～ 5.90		
11				6.5		4.50～ 6.40		
				7		4.90～ 6.90		
13	8			8		5.90～ 7.90		
15				10		7.90～ 9.90		
17				12		8.90～11.90		
20				15		10.90～14.90		
21				16		11.90～15.90		
25				20		15.90～19.90		

Name	Characters for engraving	Order code
Slash	⁄	¥
Greater	>	>
Less	<	<
Plus	+	+
Minus	−	#
Space	⬚	%
Centered dot	・	@
Period	.	&

Use ¥ for indicating/(slash), # for -(minus), % for ⬚ (space), @ for ・ (centered dot), and & for.(period).
1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
In case of 1MR,"0" is next to "9" while "A" is next to "Z".
In case of 2MR, the 1st digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the 2nd digit is increased by one.
⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.

- When placing the order for 5 pieces of EJSF1MR2—150—P1.5—1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of EJSF1MR3—150—P2.5—Z, characters for engraving "Z A B"
- When placing the order for 4 pieces of EJSF2MR4—100—P3.5—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of EJSF2MR4—100—P3.5—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of EJSF2MR6—150—P5.5—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

Order

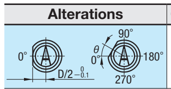
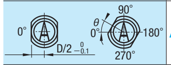
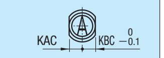
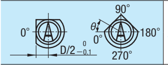
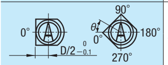
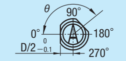
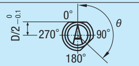
Part Number Type	Part Number Character	Part Number D	—	L	—	P	—	N	—	Characters for engraving (0～9, A～Z /><+−⬚・.)
EJSF	1M	4	—	200.00	—	P3.50	—	N150	—	A

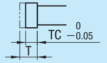
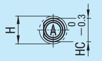
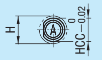
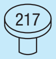
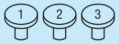
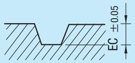
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	N	—	Characters for engraving (0～9, A～Z,/><+−⬚・.)	—	(AKC・AWC⋯etc.)
EJSF3M 5	—	250.00	—	P4.50	—	N130	—	ABC	—	AWC45

Alteration details P.127

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	
	AWC	AWC=1° increments 0≦AWC<360	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2 ⊗ Combination with other key flat cutting not available	Quotation
	ARC	ARC=1° increments 0≦ARC<360	
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged.) T−TC≦Lmax.−L	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	Quotation
	NHC	Numbering on the head How to order P.128	
	NHN	Automatic sequential numbering on the head How to order P.128	
	EC	Engraving depth alteration 0.2 ⋯▸ 0.1 Designation method EC0.1 0.2 ⋯▸ 0.3 Designation method EC0.3	

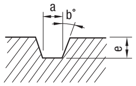
Price Quotation

■Relationship between Shaft Diameter (P) and Character Size (Q, W)

No. of characters	P	Q	W
1M **1MR** (1 character)	1.50 ～ 1.99	1.2	0.6
	2.00 ～ 2.49	1.5	0.8
	2.50 ～ 3.49	2.0	1.0
	3.50 ～ 4.49	3.0	1.5
	4.50 ～ 5.49	4.0	2.0
	5.50 ～11.99	5.0	2.5
	12.00 ～19.90	9.0	4.5
2M **2MR** (2 characters)	1.50 ～ 1.90	0.7	1.1
	2.00 ～ 2.29	0.8	1.2
	2.30 ～ 2.99	1.0	1.3
	3.00 ～ 3.99	1.5	2.0
	4.00 ～ 4.99	2.0	2.6
	5.00 ～ 5.99	2.5	3.3
	6.00 ～ 7.99	3.0	3.9
	8.00 ～11.99	4.0	5.2
	12.00 ～19.90	6.5	8.0
3M (3 characters)	2.80 ～ 3.09	0.8	1.8
	3.10 ～ 4.49	1.0	2.1
	4.50 ～ 5.49	1.5	3.2
	5.50 ～ 6.99	2.0	4.2
	7.00 ～11.99	2.5	5.3
	12.00 ～19.90	4.5	8.5
4M (4 characters)	3.60 ～ 3.89	0.8	2.4
	3.90 ～ 5.49	1.0	2.9
	5.50 ～ 6.99	1.5	4.4
	7.00 ～11.99	2.0	5.8
	12.00 ～19.90	3.5	8.8
5M (5 characters)	4.50 ～ 4.99	0.8	3.0
	5.00 ～ 6.99	1.0	3.7
	7.00 ～11.99	1.5	5.6
	12.00 ～19.90	3.0	9.0

Ejector pins	Finished products
Reversed reading (Concave character)	Right reading (Convex character)

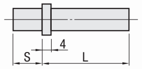
Engraving Details



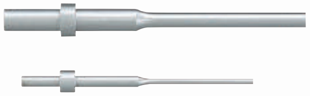
Width of engraving (a)	0.1×Q～0.2×Q
Angle of engraving (b°)	20° ± 2°
Depth of engraving (e)	0.2±0.05

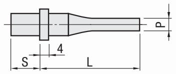
FREE FLANGE-POSITION EJECTOR PINS

STRAIGHT EJECTOR PINS WITH FREE FLANGE POSITION

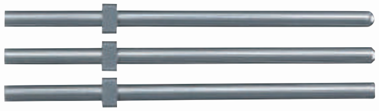
Classification \ Shape						
Material	Head Thickness (T)	Shaft Diameter (P)Tolerance	L dimension designation type		L・P demension designation type	
			Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	$^{0}_{-0.005}$	EPSH	P.175	EPSHB	P.175
		$^{-0.01}_{-0.02}$	EPSHE		EPSHBE	
SKD61 equivalent	4mm(T4)	$^{-0.01}_{-0.02}$	EPSN	P.177	EPSNB	P.177

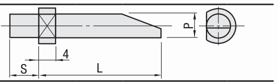
STEPPED EJECTOR PINS WITH FREE FLANGE POSITION



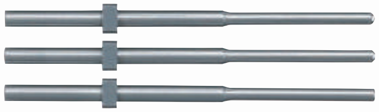
Classification \ Shape				
Material	Head Thickness (T)	Tip Diameter (P) Tolerance	L・N・P dimension designation type	
			Part Number	Page
SKH51 equivalent	4mm (T4)	$^{0}_{-0.005}$	EPSHS	P.179
		$^{-0.01}_{-0.02}$	EPSHSE	

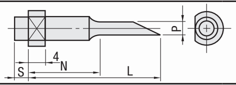
FREE FLANGE POSITION STRAIGHT EJECTOR PINS WITH TIP PROCESS



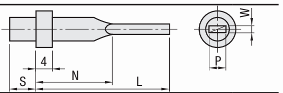
Classification \ Shape						
Material	Head Thickness (T)	Shaft Diameter (P)Tolerance	Tip Processed			
			L dimension designation type		L・P dimension designation type	
			Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	$^{0}_{-0.005}$	EPSH□A	P.185	EPSHB□A	P.185
		$^{-0.01}_{-0.02}$	EPSHE□A		EPSHBE□A	

FREE FLANGE POSITION STEPPED EJECTOR PINS WIH TIP PROCESS

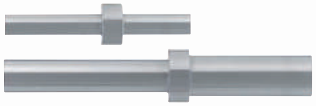


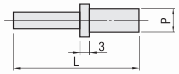
Classification \ Shape				
Material	Head Thickness (T)	Tip Diameter (P) Tolerance	Tip Processed (L・P・N dimension designation type)	
			Part Number	Page
SKH51 equivalent	4mm (T4)	$^{0}_{-0.005}$	EPSHS□A	P.187
		$^{-0.01}_{-0.02}$	EPSHSE□A	

RECTANGULAR EJECTOR PINS WITH FREE FLANGE POSITION

Classification \ Shape				
Material	Head Thickness (T)	Tip (P・W) Tolerance	Part Number	Page
SKH51 equivalent	4mm (T4)	$^{0}_{-0.005}$	ERSH	P.189
		$^{0}_{-0.01}$	ERSHE	

PUSHER PINS WITH SPRING GUIDE

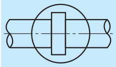
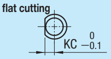
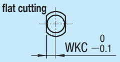
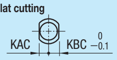
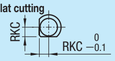
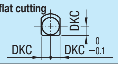
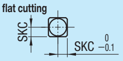
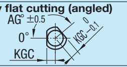
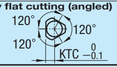
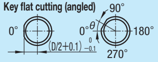
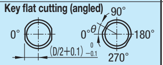
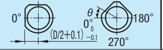
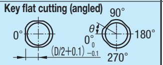
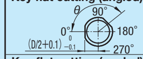
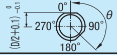
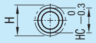
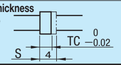


Classification \ Shape				
Material	Head Thickness (T)	Tip (P) Tolerance	Part Number	Page
SKH51 equivalent	3mm	$^{0}_{-0.005}$	EPCH	P.191
		$^{-0.01}_{-0.02}$	EPCHE	

ALTERATION GUIDE FOR FREE FLANGE-POSITION EJECTOR PINS

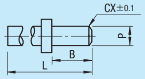
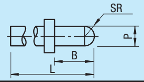
❗ Non JIS material definition is listed on P.1351 - 1352

■Alteraton Guide for Free Flange-Position Ejector Pins

Items	Applicable Products	Alterations	Codes	Specifications	1Code
 Head alteration	Free Flange-Position Ejector Pins (*Except tip processing)	Key flat cutting 	KC	Single flat cutting Designation range D/2+0.1≦KC<H/2	Quotation
		Key flat cutting 	WKC	Two parallel flats cutting Designation range D/2+0.1≦WKC<H/2	
		Key flat cutting 	KAC KBC	Varied width parallel flats cutting Designation range D/2+0.1≦KAC KAC<KBC<H/2	
		Key flat cutting 	RKC	Right angled two falts cutting Designation range D/2+0.1≦RKC<H/2	
		Key flat cutting 	DKC	Three flats cutting Designation range D/2+0.1≦DKC<H/2	
		Key flat cutting 	SKC	Four flats cutting Designation range D/2+0.1≦SKC<H/2	
		Key flat cutting (angled) 	KGC	Adds a flat at the reference plane (0°), and another at the designated angle from there. Designation range D/2+0.1≦KGC<H/2 AG=1° increments ❗ 0° <AG<360°	
		Key flat cutting (angled) 	KTC	Three flats cutting at 120° Designation range D/2+0.1≦KTC<H/2	
	Free Flange-position Ejector Pins with Tip Process	Key flat cutting (angled) 	AKC	Adds two flats at the standard (0°) position, or at the designation angle (clockwise in 1° increments from the standard position). Designation range 0° <AKC<360° ❗ No need to designate AKC0 ❗ Key flat cutting position is (D/2+0.1) Unit of designation 1° increments Designation method θ=45° ···› AKC45	
		Key flat cutting (angled) 	AWC	Adds two parallel flats at the standard (0°) position, or at the designated angle (clockwise in 1° increments from the standard position). Designation range 0° ≦AWC<360° ❗ Key flat cutting position is (D/2+0.1) Unit of designation 1° increments Designation method θ=0° ···› AWC0, θ=45° ···› AWC45	
		Key flat cutting (angled) 	ARC	Adds two right-angled flats at the standard (0°) position, moreover at the designated angle (clockwise in 1° increments from the standard position). Designation range 0° ≦ARC<360° ❗ Key flat cutting position is (D/2+0.1) Unit of designation 1° increments Designation method θ=0° ···› ARC0, θ=45° ···› ARC45	
		Key flat cutting (angled) 	ADC	Adds three flats at the standard (0°) position, or at the designated angle (clockwise in 1° increments from the standard position). Designation range 0° ≦ADC<360° ❗ Key flat cutting position is (D/2+0.1) Unit of designation 1° increments Designation method θ=0° ···› ADC0, θ=45° ···› ADC45	
		Key flat cutting (angled) 	KGA	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position). Adds another flat so that two flats are added totally. Designation range 0° <KGA<360° ❗ Key flat cutting position is (D/2+0.1) Unit of designation 1° increments Designation method θ=135° ···› KGA135	
		Key flat cutting (angled) 	KGB	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position). Adds another flat so that two flats are added totally. Designation range 0° <KGB<360° ❗ Key flat cutting position is (D/2+0.1) Unit of designation 1° increments Designation method θ=135° ···› KGB135	
	Free Flange-Position Ejector Pins	Changes head diameter 	HC	Reduces head diameter. Designation range P+1≦HC<H Unit of designation 0.1mm increments Designation method HC6.5	
		Head thickness change 	TC	Reduces the head thickness. Designation range 2.0≦TC≦10 and TC≦(L−10) or (N−10) or (F−10) (Dimensions L, N and S remain unchanged.)	

❗ Note that designating H/2−0.15 or more for Key flat cutting alteration will create hardly any flat on the head.

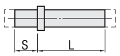
■Alteration Guide for Pusher Pins with Spring Guide

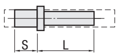
Items	Applicable Products	Alterations	Codes	Specifications	1Code
Tip process	Pusher Pins with Spring Guide		CX	Performs C chamfering on the tip. Designation range CX=0.1mm increments ❗ 0.3≦CX≦0.5 ❗ Available for B−CX≧10 Designation method CX 0.3	Quotation
			SR	Finishes the top in spherical shape (SR). Designation range SR=P/2 ❗ Available for B−P/2≧10 Designation method SR	

High Speed Steel
SKH51 equivalent

STRAIGHT EJECTOR PINS WITH FREE FLANGE POSITION

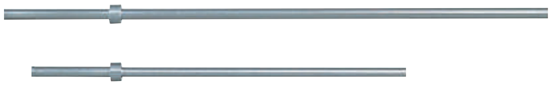
— L DIMENSION DESIGNATION TYPE ／ L・P DIMENSION DESGINATION TYPE —

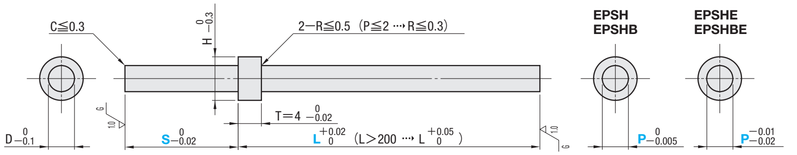
L dimension designation type


L・P dimension desgnation type


Non JIS material definition is listed on P.1351 - 1352

RoHS




C≦0.3
H $^{0}_{-0.3}$
2−R≦0.5（P≦2 ··· R≦0.3）
EPSH
EPSHB
EPSHE
EPSHBE
T=4 $^{0}_{-0.02}$
D $^{0}_{-0.1}$
S $^{0}_{-0.02}$
L $^{+0.02}_{0}$（L>200 ··· L $^{+0.05}_{0}$）
G
1.0
P $^{0}_{-0.005}$
P $^{-0.01}_{-0.02}$

Part Number	Head Thickness	ⓉP
EPSH (L dimension designation type) **EPSHB**(L・P dimension designation type)	4mm (T4)	$^{0}_{-0.005}$
EPSHE (L dimension designation type) **EPSHBE**(L・P dimension designation type)		$^{-0.01}_{-0.02}$

Range of guaranteed shaft diameter precision (Details P.1301)
Ⓜ SKH51 equivalent
Ⓗ 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

■L Dimension Designation Type

H	D	Part Number Type	Part Number P	0.01mm increments L	0.01mm increments S
3	1	**EPSH** (P $^{0}_{-0.005}$) **EPSHE** (P $^{-0.01}_{-0.02}$)	1	5.00～150.00	5.00～40.00
	1.5		1.5		
4	2		2	5.00～200.00	
5	2.5		2.5		
6	3		3	5.00～250.00	5.00～50.00
7	3.5		3.5		
	4		4		
8	4.5		4.5		
	5		5		
9	5.5		5.5		
	6		6		
10	6.5		6.5		
	7		7		

■L・P Dimension Designation Type

H	D	Part Number Type	Part Number No.	0.01mm increments L	0.01mm increments P	0.01mm increments S
3	1.5	**EPSHB** (P $^{0}_{-0.005}$) **EPSHBE** (P $^{-0.01}_{-0.02}$)	1.5	5.00～150.00	1.00～1.49	5.00～40.00
4	2		2	5.00～200.00	1.50～1.99	
5	2.5		2.5		2.00～2.49	
6	3		3	5.00～250.00	2.50～2.99	5.00～50.00
7	3.5		3.5		3.00～3.49	
	4		4		3.50～3.99	
8	4.5		4.5		4.00～4.49	
	5		5		4.50～4.99	
9	5.5		5.5		5.00～5.49	
	6		6		5.50～5.99	
10	6.5		6.5		6.00～6.49	
	7		7		6.50～6.99	

Order

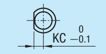
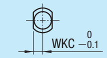
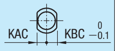
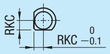
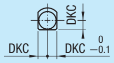
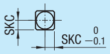
Part Number		L		P		S
EPSH 5	—	60.00			—	S10.00
EPSHB 3.5	—	117.32	—	P3.25	—	S26.30

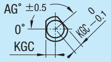
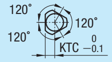
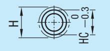
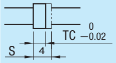
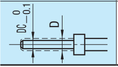
Days to Ship Quotation

Alterations

Part Number		L		P		S		(HC・TC・DC···etc.)
EPSH 5	—	60.00			—	S10.00	—	TC3.0
EPSHB 5	—	60.00	—	P4.50	—	S10.00	—	TC3.0

Alteration details P.174

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments D/2+0.1≦KC<H/2	Quotation
	WKC	WKC=0.1mm increments D/2+0.1≦WKC<H/2	
	KAC KBC	KAC, KBC=0.1mm increments D/2+0.1≦KAC<KBC<H/2	
	RKC	RKC=0.1mm increments D/2+0.1≦RKC<H/2	
 DKC DKC DKC $^{0}_{-0.1}$	DKC	DKC=0.1mm increments D/2+0.1≦DKC<H/2	
	SKC	SKC=0.1mm increments D/2+0.1≦SKC<H/2	

Alterations	Code	Spec.	1Code
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	KGC=0.1mm increments AG=1° increments D/2+0.1≦KGC<H/2, 0<AG<360	Quotation
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	KTC=0.1mm increments D/2+0.1≦KTC<H/2	
	HC	HC=0.1mm increments P+1≦HC<H	
	TC	TC=0.1mm increments 2.0≦TC≦10 and TC≦L−10 (Dimensions L and S remain unchanged.)	
	DC	DC=0.1mm increments P−1≦DC<D and DC≧1.5 Available for L・P Dimension designation type only. Only available combination is with HC・TC	

Price Quotation

Example

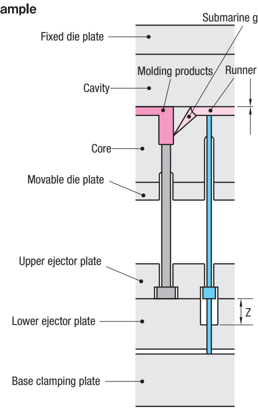

Submarine gate
Fixed die plate
Cavity
Molding products
Runner
P.L.
Core
Movable die plate
Upper ejector plate
Z
Lower ejector plate
Base clamping plate

Fig. 1 ● Mold closed

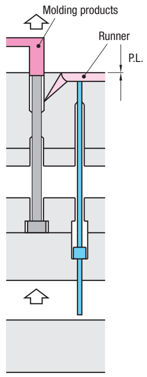

Molding products
Runner
P.L.

Fig. 2 ● Mold opening

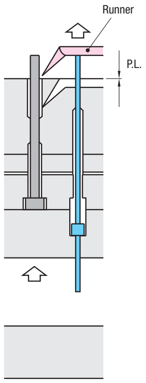
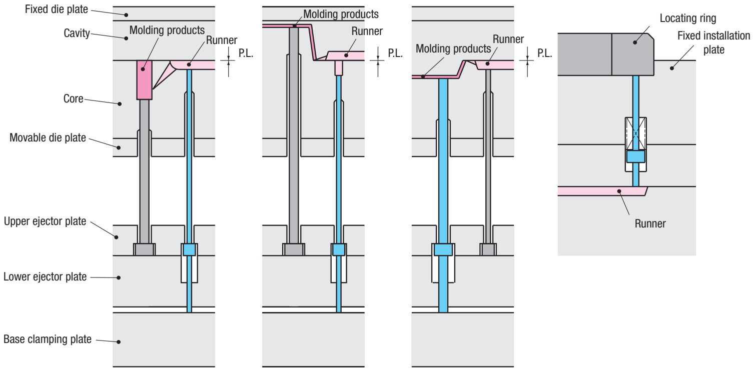


Fig. 3 ● Mold opened

Free flange position ejector pins can be ejected in differential time.
The runner can be slowly ejected by the depth of counter bore Z (Fig.1).
They are applicable to ejection of molded products and two-step ejection.

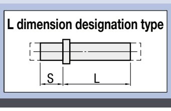

Fixed die plate
Cavity
Molding products
Runner
P.L.
Core
Movable die plate
Upper ejector plate
Lower ejector plate
Base clamping plate
Molding products
Runner
P.L.
Molding products
Runner
P.L.
Locating ring
Fixed installation plate
Runner

Dies Steel
SKD61 equivalent
+
Nitrided

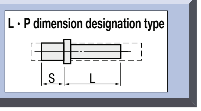
STRAIGHT EJECTOR PINS WITH FREE FLANGE POSITION

— L DIMENSION DESIGNATION TYPE ／ L・P DIMENSION DESIGNATION TYPE —

L dimension designation type

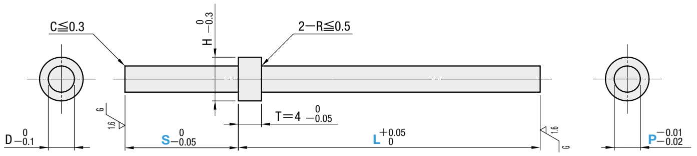


L・P dimension designation type



Non JIS material definition is listed on P.1351 - 1352

RoHS


C≦0.3
H $^{0}_{-0.3}$
2−R≦0.5
D $^{0}_{-0.1}$
S $^{0}_{-0.05}$
T=4 $^{0}_{-0.05}$
L $^{+0.05}_{0}$
P $^{-0.01}_{-0.02}$
1.6
G

Part Number	Head Thickness	T P
EPSN (L dimension designation type)	4mm (T4)	−0.01 −0.02
EPSNB (L・P dimension designation type)		

M SKD61 equivalent+Nitrided
H Surface : 900HV∼
Base material:40∼45HRC
Range of guaranteed base material hardness
(Details P.1303)
Both end faces are not nitrided to prevent them from chipping.

H	D	Part Number Type	P	0.01mm increments L	S
7	4	EPSN	4	5.00∼400.00	5.00∼80.00
8	5		5		
9	6		6		
10	7		7	5.00∼500.00	5.00∼80.00
11	8		8		
15	10		10		
17	12		12		
20	15		15		

H	D	Part Number Type	No.	0.01mm increments L	P	S
7	4	EPSNB	4	5.00∼400.00	3.50∼ 3.99	5.00∼80.00
8	5		5		4.00∼ 4.99	
9	6		6		5.00∼ 5.99	
10	7		7	5.00∼500.00	6.00∼ 6.99	5.00∼80.00
11	8		8		7.00∼ 7.99	
15	10		10		8.00∼ 9.99	
17	12		12		10.00∼11.99	
20	15		15		12.00∼14.99	

Order

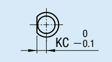
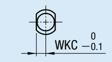
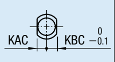
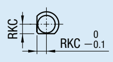
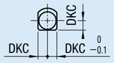
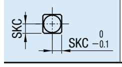
Part Number	—	L	—	P	—	S
EPSN5	—	60.00			—	S10.00
EPSNB5	—	117.32	—	P4.25	—	S26.30

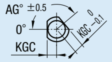
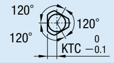
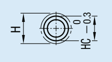
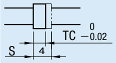
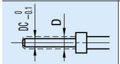
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	S	—	(HC・TC・DC···etc.)
EPSN5	—	60.00			—	S10.00	—	TC3.0
EPSNB5	—	60.00	—	P4.50	—	S10.00	—	TC3.0

Alteration details P.174

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments D/2+0.1≦KC<H/2	Quotation
	WKC	WKC=0.1mm increments D/2+0.1≦WKC<H/2	
	KAC KBC	KAC, KBC=0.1mm increments D/2+0.1≦KAC<KBC<H/2	
	RKC	RKC=0.1mm increments D/2+0.1≦RKC<H/2	
	DKC	DKC=0.1mm increments D/2+0.1≦DKC<H/2	
	SKC	SKC=0.1mm increments D/2+0.1≦SKC<H/2	

Alterations	Code	Spec.	1Code
	KGC	KGC=0.1mm increments AG=1° increments D/2+0.1≦KGC<H/2, 0<AG<360	Quotation
	KTC	KTC=0.1mm increments D/2+0.1≦KTC<H/2	
	HC	HC=0.1mm increments P+1≦HC<H	
	TC	TC=0.1mm increments 2.0≦TC≦10 and TC≦L−10 (Dimensions L and S remain unchanged.)	
	DC	DC=0.1mm increments P−1≦DC<D Available for L・P Dimension designation type only. Only available combination is with HC・TC	

Price Quotation

Example

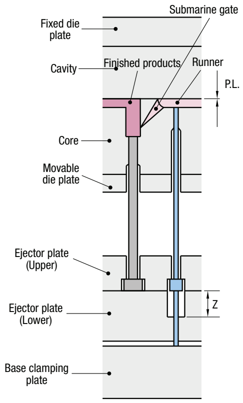

Submarine gate
Fixed die plate
Cavity
Finished products
Runner
P.L.
Core
Movable die plate
Ejector plate (Upper)
Ejector plate (Lower)
Z
Base clamping plate

Fig. 1 ● Mold closed

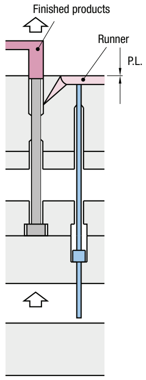

Finished products
Runner
P.L.

Fig. 2 ● Mold opening

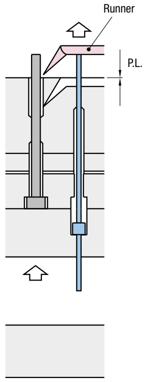


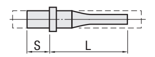
Fig. 3 ● Mold opened

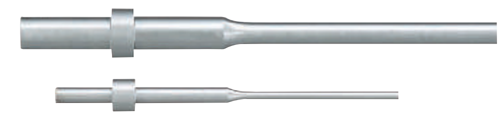
Free flange position ejector pins can be ejected in differential time.
The runner can be slowly ejected by the depth of counter bore Z (Fig.1).
They are applicable to ejection of molded products and two-step ejection.

High Speed Steel
SKH51 equivalent

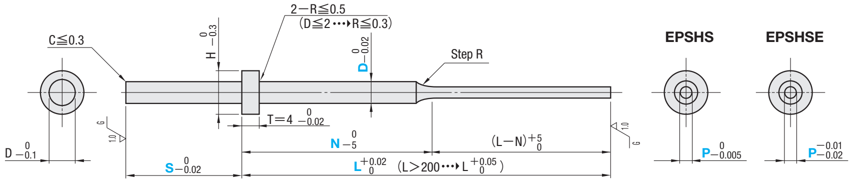
STEPPED EJECTOR PINS WITH FREE FLANGE POSITION

L · P · N dimension desgnation type





RoHS


C≦0.3
H $^{0}_{-0.3}$
2−R≦0.5
(D≦2···▸R≦0.3)
D $^{0}_{-0.02}$
Step R
EPSHS
EPSHSE
D $^{0}_{-0.1}$
T=4 $^{0}_{-0.02}$
N $^{0}_{-5}$
(L−N)$^{+5}_{0}$
S $^{0}_{-0.02}$
L $^{+0.02}_{0}$ (L>200···▸L $^{+0.05}_{0}$)
P $^{0}_{-0.005}$
P $^{-0.01}_{-0.02}$
1.0
G

Part Number	Head Thickness	T P
EPSHS	4mm(T4)	$^{0}_{-0.005}$
EPSHSE		$^{-0.01}_{-0.02}$

※ Range of guaranteed shaft diameter precision (D) (Details P.1301)
※ Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

H	Part Number		0.01mm increments		1mm increments	0.01mm increments
	Type	D	L	P	N	S
3	EPSHS (P $^{0}_{-0.005}$) EPSHSE (P $^{-0.01}_{-0.02}$)	1.5	35.00～200.00	0.80～1.40	N≧15 and 20≦(L−N)≦150	5.00～40.00
4		2		0.80～1.90		
5		2.5		0.80～2.40		
6		3	35.00～250.00	1.00～2.90	N≧15 and 20≦(L−N)≦185	5.00～50.00
7		3.5		1.50～3.40		
		4		1.50～3.90		
8		4.5		2.50～4.40		
		5		3.00～4.90		
9		5.5		3.50～5.40		
		6		4.00～5.90		

Order

Part Number	—	L	—	P	—	N	—	S
EPSHS 5	—	60.00	—	P4.62	—	N30	—	S10.00

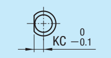
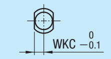
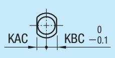
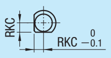
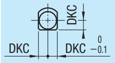
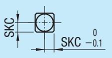
Days to Ship **Quotation**

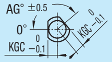
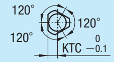
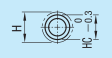
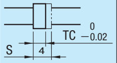
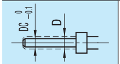
Non JIS material definition is listed on P.1351 - 1352

Alterations

Part Number	—	L	—	P	—	N	—	S	—	(HC · TC · DC···etc.)
EPSHS 5	—	60.00	—	P4.62	—	N30	—	S10.00	—	TC3.0

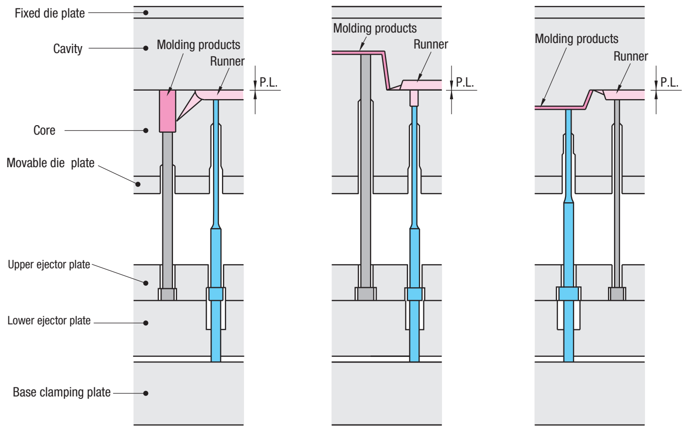
Alteration details P.174

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments D/2+0.1≦KC<H/2	
	WKC	WKC=0.1mm increments D/2+0.1≦WKC<H/2	
	KAC KBC	KAC, KBC=0.1mm increments D/2+0.1≦KAC<KBC<H/2	Quotation
	RKC	RKC=0.1mm increments D/2+0.1≦RKC<H/2	
 DKC DKC DKC $^{0}_{-0.1}$	DKC	DKC=0.1mm increments D/2+0.1≦DKC<H/2	
	SKC	SKC=0.1mm increments D/2+0.1≦SKC<H/2	

Alterations	Code	Spec.	1Code
 AG° ±0.5 0° KGC $^{0}_{-0.1}$ KGC $^{0}_{-0.1}$	KGC	KGC=0.1mm increments AG=1° increments D/2+0.1≦KGC<H/2, 0<AG<360	
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	KTC=0.1mm increments D/2+0.1≦KTC<H/2	Quotation
	HC	HC=0.1mm increments D+1≦HC<H	
	TC	TC=0.1mm increments 2.0≦TC≦10 and TC≦N−10 (Dimensions L, N and S remain unchanged.)	
	DC	DC=0.1mm increments D−2≦DC<D and DC≧1.5 Alteration of D size applies on the S dimension side only.	

Price **Quotation**

Example

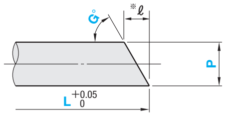

Fixed die plate
Cavity
Molding products
Runner
P.L.
Core
Movable die plate
Upper ejector plate
Lower ejector plate
Base clamping plate
Molding products
Runner
P.L.
Molding products
Runner
P.L.

SHAPE VARIATION OF FREE FLANGE POSITION STRAIGHT EJECTOR PINS WITH TIP PROCESS ①

—1A～20A SHAPE—

21A～32A Shape
P.183・184

1A (Bezel・Angle designation)

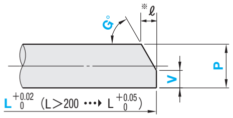


※ℓ calculation

$\ell = \frac{P}{\tan G}$

- 45° ≦G<90°

2A (Partial bezel・Angle designation)

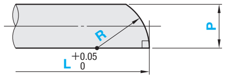

G°
※ℓ
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

※ℓ calculation

$\ell = \frac{P-V}{\tan G}$

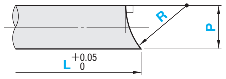
- 45° ≦G<90°
- 1.5≦V<P

3A (Outer R processing)



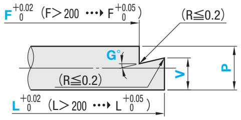
- P≦R≦15

4A (Inward R)



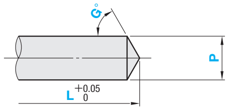
- P≦R≦15

5A (Z groove)


F +0.02 0 (F>200 ···▸ F +0.05 0)
(R≦0.2)
G°
(R≦0.2)
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

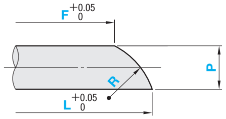
- 0° ≦G≦45°
- 1.5≦V<P
- L−F≦10
- V−(L−F)tanG≧1
- ⊗ R designation not available.

6A (Cone)



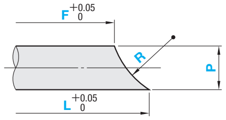
- 45° ≦G<90°

7A (Outer R processing・F designation)


F +0.05 0
R
P
L +0.05 0

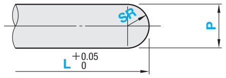
- L−F≦P<R≦15

8A (Inward R with F designation)


F +0.05 0
R
P
L +0.05 0

- L−F≦P<R≦15

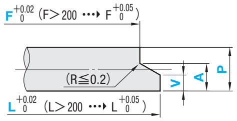
9A (Spherical)



- Default:SR=$\frac{P}{2}$

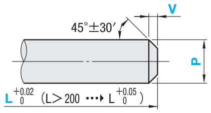
SR may be designated within
- $\frac{P}{2}$<SR≦2P range.

10A (Trapezoid)


F +0.02 0 (F>200 ···▸ F +0.05 0)
(R≦0.2)
V
A
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

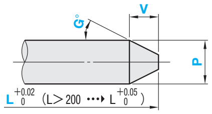
- 1.5≦V<P
- V≦A<P
- L−F≦5
- ⊗ R designation not available.

11A (C chamfered)


45°±30′
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

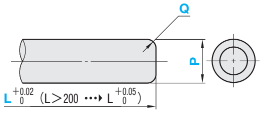
- 0.1≦V≦$\left(\frac{P}{2}-0.1\right)$

12A (Tapered)


G°
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

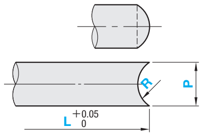
- 0.1≦V≦(P×2), $\frac{P}{2}$−VtanG≧0.1
- 0° <G≦45°

13A (R chamfered)


Q
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

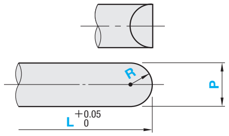
- 0.2≦Q≦$\left(\frac{P}{2}-0.1\right)$

14A (R groove)



- (P×1.2)≦R≦(P×2)

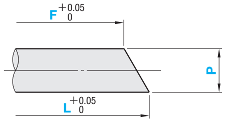
15A (R surface)



- Default:R=$\frac{P}{2}$

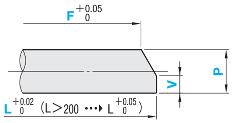
R may be designated within
- $\frac{P}{2}$<R≦2P range.

16A (Bezel・F specification)


F +0.05 0
P
L +0.05 0

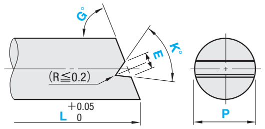
- 0.05≦(L−F)≦P

17A (Partial bezel・F specification)


F +0.05 0
V
P
L +0.02 0 (L>200 ···▸ L +0.05 0)

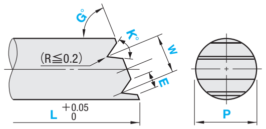
- 0.05≦(L−F)≦(P−V)
- 1.5≦V<P

18A (Bezel+1 groove)


G°
K°
E
(R≦0.2)
L +0.05 0
P

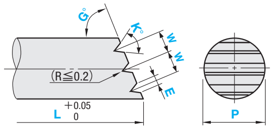
- 45° ≦G<90°
- 0.3≦E≦3.0
- E≦$\frac{P}{2}$
- K Selection 60° or 90°
- ⊗ R designation not available.

19A (Bezel+2 groove)


G°
K°
W
E
(R≦0.2)
L +0.05 0
P

- 45° ≦G<90°
- 0.3≦E≦3.0
- E≦$\frac{P}{2}$
- (E+0.2)≦W≦(P−E−0.4)
- K Selection 60° or 90°
- ⊗ R designation not available.

20A (Bezel+3 groove)


G°
K°
W
W
E
(R≦0.2)
L +0.05 0
P

- 45° ≦G<90°
- 0.3≦E≦3.0
- E≦$\frac{P}{2}$
- (E+0.2)≦W≦(P−$\frac{E}{2}$−0.2)
- K Selection 60° or 90°
- ⊗ R designation not available.

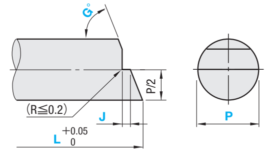
SHAPE VARIATION OF FREE FLANGE POSITION STRAIGHT EJECTOR PINS WITH TIP PROCESS ②

—21A～32A SHAPES—

1A～20A Shape
P.181・182

Non JIS material definition is listed on P.1351 - 1352

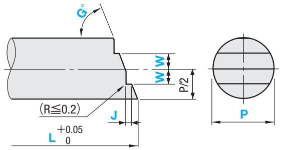
21A (Bezel＋1 vertical groove)


G°
P/2
(R≦0.2)
J
P
$L^{+0.05}_{0}$

- $45^\circ \leqq G < 90^\circ$
- $0.3 \leqq J \leqq 3.0$

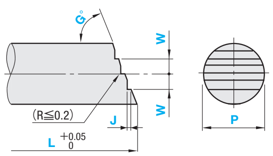
⊗ R designation not available.
- $J \leqq \frac{P}{3\tan G}$

22A (Bezel＋2 vertical groove)


G°
W
W
P/2
(R≦0.2)
J
P
$L^{+0.05}_{0}$

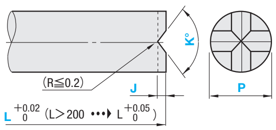
- $45^\circ \leqq G < 90^\circ$
- $J \leqq \frac{P}{4\tan G}$
- $0.3 \leqq J \leqq 3.0$
- $0.1 + J\tan G \leqq W \leqq (\frac{P}{2} - 0.2)$

23A (Bezel＋3 vertical groove)

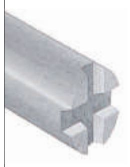

G°
W
W
(R≦0.2)
J
P
$L^{+0.05}_{0}$

- $45^\circ \leqq G < 90^\circ$
- $J \leqq \frac{P}{5\tan G}$
- $0.3 \leqq J \leqq 3.0$
- $0.1 + J\tan G \leqq W \leqq (\frac{P}{2} - 0.2)$

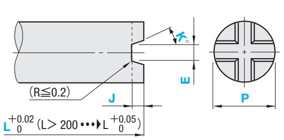
24A (Cross groove・Triangle shaped)


K°
(R≦0.2)
J
P
$L^{+0.02}_{0}$ (L＞200 ⋯▸ $L^{+0.05}_{0}$)

- $0.3 \leqq J \leqq 3.0$
- $J \leqq \frac{P}{3}$
- $30^\circ \leqq K^\circ \leqq 90^\circ$ (5° increments)

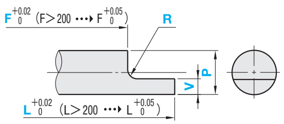


25A (Cross groove・Trapezoid-shaped)


K°
E
(R≦0.2)
J
P
$L^{+0.02}_{0}$ (L＞200 ⋯▸ $L^{+0.05}_{0}$)

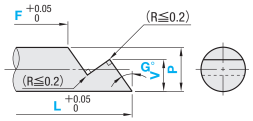
- $0.3 \leqq J \leqq 3.0$
- $E \leqq \frac{P}{3}$
- $0.3 \leqq E \leqq 3.0$
- $0^\circ \leqq K^\circ \leqq 45^\circ$ (5° increments)
- $J \leqq \frac{P}{3}$

26A (L-shaped processing・R designation)


$F^{+0.02}_{0}$ (F＞200 ⋯▸ $F^{+0.05}_{0}$)
R
P
V
$L^{+0.02}_{0}$ (L＞200 ⋯▸ $L^{+0.05}_{0}$)

- $0.3 \leqq R \leqq (P - V)$ and $R \leqq (L - F)$
- $0.2 \leqq (L - F) \leqq (V \times 5)$
- $1 \leqq V < P$

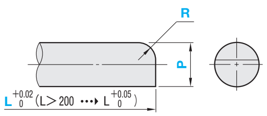
27A (Bezel・Z groove)


$F^{+0.05}_{0}$
(R≦0.2)
(R≦0.2)
G°
V
P
$L^{+0.05}_{0}$

- $1 \leqq (L - F) \leqq (V \times 5)$
- $0^\circ < G \leqq 45^\circ$
- $1.5 \leqq V < P$

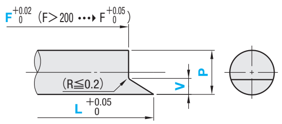
⊗ R designation not available.

28A (Half R)


R
P
$L^{+0.02}_{0}$ (L＞200 ⋯▸ $L^{+0.05}_{0}$)

- $(P \times 0.1) \leqq R < (P \times 0.8)$

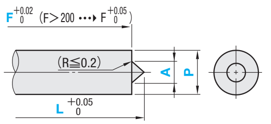
29A (L-shaped processing・Tapered)


$F^{+0.02}_{0}$ (F＞200 ⋯▸ $F^{+0.05}_{0}$)
(R≦0.2)
V
P
$L^{+0.05}_{0}$

- $0.2 \leqq (L - F) \leqq V \times 5$
- $0.3 \leqq V < P$

⊗ R designation not available.

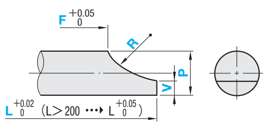
30A (Umbo)


$F^{+0.02}_{0}$ (F＞200 ⋯▸ $F^{+0.05}_{0}$)
(R≦0.2)
A
P
$L^{+0.05}_{0}$

- $1 \leqq A \leqq (P - 1)$ and $\frac{P}{3} \leqq A$
- $1 \leqq (L - F) \leqq (A \times 3)$

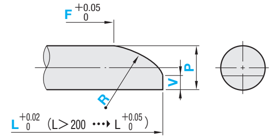
⊗ R designation not available.

31A (Inward R with F/V designation)


$F^{+0.05}_{0}$
R
V
P
$L^{+0.02}_{0}$ (L＞200 ⋯▸ $L^{+0.05}_{0}$)

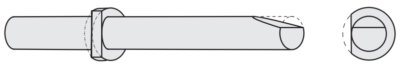
- $P < R \leqq 15$
- $1.5 \leqq V < P$
- $L - F > R - \sqrt{R^2 - (P - V)^2}$

32A (Outward R with F/V designation)

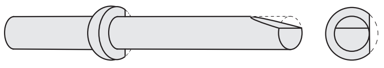

$F^{+0.05}_{0}$
R
V
P
$L^{+0.02}_{0}$ (L＞200 ⋯▸ $L^{+0.05}_{0}$)

- $P < R \leqq 15$
- $1.5 \leqq V < P$
- $L - F > R - \sqrt{R^2 - (P - V)^2}$

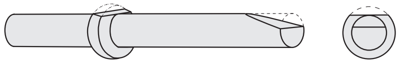
■Flats cutting position for 2A shape



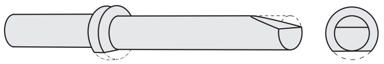
AKC0



AKC180

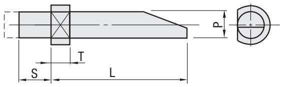


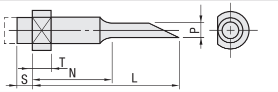
AKC90



AKC270

■Products list

Classification			Shape 			
Material	Head Thickness (T)	Tip Diameter (P) Tolerance	Tip Processed			
			L dimension designation type		L・P dimension designation type	
			Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	0 −0.005	EPSH□A	P.185	EPSHB□A	P.185
		−0.01 −0.02	EPSHE□A		EPSHBE□A	

Classification			Shape 	
Material	Head Thickness (T)	Tip Diameter (P) Tolerance	Tip Processed (L・P・N dimension designation type)	
			Part Number	Page
SKH51 equivalent	4mm (T4)	0 −0.005	EPSHS□A	P.187
		−0.01 −0.02	EPSHSE□A	

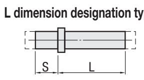
■Unit of designation

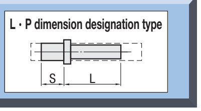
T	Unit of designation
G±30′	1° increments
K±30′	Select 60° or 90° for 18A, 19A and 20A. 24A・25A 5° increments
R±0.02 (15A Shape・26A Shape ⋯→ R±0.1)	0.1mm increments
SR±0.1	0.1mm increments
A±0.05	0.1mm increments
V±0.05	0.1mm increments
E±0.02	0.1mm increments
J±0.02	0.1mm increments
W±0.02	0.1mm increments
Q±0.1	0.1mm increments
F	0.01mm increments

High Speed Steel
SKH51 equivalent

FREE FLANGE POSITION STRAIGHT EJECTOR PINS WITH TIP PROCESS

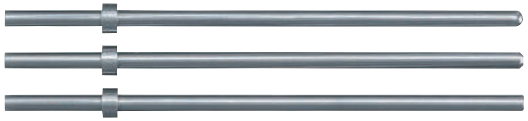
— L DIMENSION DESIGNATION TYPE / L・P DIMENSION DESIGNATION TYPE —

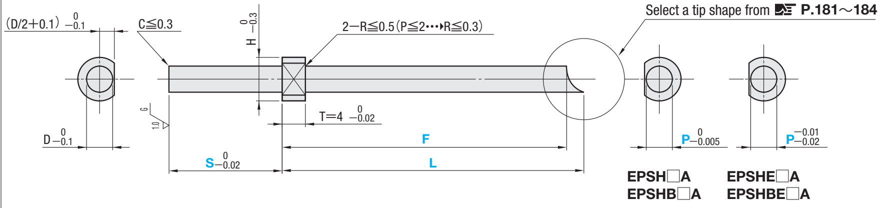




Non JIS material definition is listed on P.1351 - 1352

RoHS





EPSH□A
EPSHB□A

EPSHE□A
EPSHBE□A

Range of guaranteed shaft diameter precision (Details P.1301)

Part Number	Head Thickness	T P
EPSH□A (L dimension designation type) EPSHB□A(L・P dimension designation type)	4mm (T4)	0 −0.005
EPSHE□A (L dimension designation type) EPSHBE□A(L・P dimension designation type)		−0.01 −0.02

Key flat is made on the standard 0° to determine the tip shape position.

Key flat cutting position is (D/2+0.1).

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

■L Dimension Designation Type

H	D	Part Number			0.01mm increments	
		Type	Tip shape	P	L	S
3	1.5	EPSH (P $^{0}_{-0.005}$) EPSHE (P $^{-0.01}_{-0.02}$)	1A 12A 23A	1.5	50.00～150.00	5.00～40.00
4	2		2A 13A 24A	2	50.00～200.00	
5	2.5		3A 14A 25A	2.5		
6	3		4A 15A 26A	3	50.00～250.00	5.00～50.00
7	3.5		5A 16A 27A	3.5		
	4		6A 17A 28A	4		
8	4.5		7A 18A 29A	4.5		
	5		8A 19A 30A	5		
9	5.5		9A 20A 31A	5.5		
	6		10A 21A 32A	6		
10	6.5		11A 22A	6.5		
	7			7		

Please select a tip shape of 1A～32A from P.181～184

■L・P Dimension Designation Type

H	D	Part Number			0.01mm increments		
		Type	Tip shape	No.	L	P	S
4	2	EPSHB (P $^{0}_{-0.005}$) EPSHBE (P $^{-0.01}_{-0.02}$)	1A 12A 23A	2	50.00～200.00	1.50～1.99	5.00～40.00
5	2.5		2A 13A 24A	2.5		2.00～2.49	
6	3		3A 14A 25A	3	50.00～250.00	2.50～2.99	5.00～50.00
7	3.5		4A 15A 26A	3.5		3.00～3.49	
	4		5A 16A 27A	4		3.50～3.99	
8	4.5		6A 17A 28A	4.5		4.00～4.49	
	5		7A 18A 29A	5		4.50～4.99	
9	5.5		8A 19A 30A	5.5		5.00～5.49	
	6		9A 20A 31A	6		5.50～5.99	
10	6.5		10A 21A 32A	6.5		6.00～6.49	
	7		11A 22A	7		6.50～6.99	

Please select a tip shape of 1A～32A from P.181～184

Order

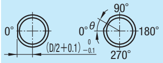
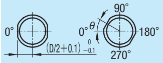
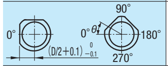
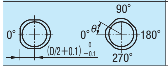
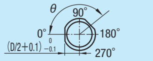
Part Number				L		P		S		Sequence of A・V・E・J・W・R・SR・F・G・K・Q
Type	Tip shape	PorNo.	—		—		—		—	
EPSH	1A	5	—	60.00			—	S10.00	—	G60
EPSHB	1A	5	—	117.32	—	P4.75	—	S26.30	—	G60

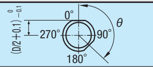
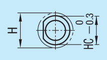
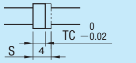
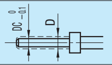
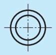
Days to Ship Quotation

Alterations

Part Number		L		P		S		A・V・E・J・W・R・SR・F・G・K・Q		(AKC・AWC···etc.)
EPSH1A5	—	60.00			—	S10.00	—	G60	—	TC3.0
EPSHB1A5	—	117.32	—	P4.75	—	S26.30	—	G60	—	HC6

Alteration details P.174

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	

Alterations	Code	Spec.	1Code
	KGB	KGB=1° increments 0<KGB<360	Quotation
	HC	HC=0.1mm increments P+1≦HC<H	
	TC	TC=0.1mm increments 2.0≦TC≦10 and TC≦F−10 (Dimensions L and S remain unchanged)	
	DC	DC=0.1mm increments P−1≦DC<D and DC≧1.5 Available for L・P Dimension designation type only. Only available combination is with HC・TC	
	NKC	Without key flat cutting Available for tip shapes 6A・9A・11A・12A・13A・30A Only available combination is with HC・TC	

Price Quotation

Free Flange-Position Ejector Pins

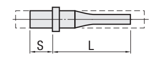
High Speed Steel
SKH51
equivalent

High Speed Steel
SKH51 equivalent

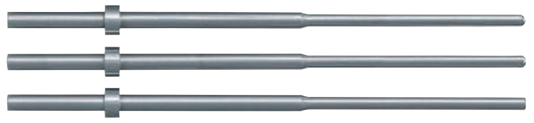
FREE FLANGE POSITION STEPPED EJECTOR PINS WITH TIP PROCESS

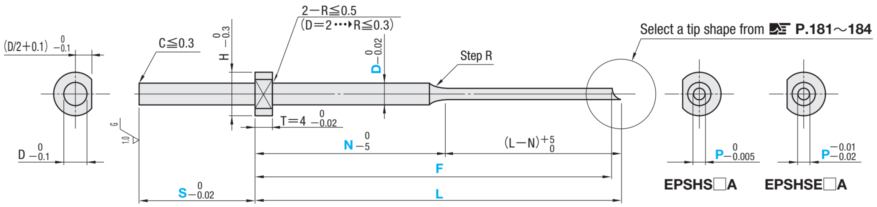
— L・P・N DIMENSION DESIGNATION TYPE —

L・P・N dimension designation type



Non JIS material definition is listed on P.1351 - 1352


RoHS



Select a tip shape from P.181～184

※ Range of guaranteed shaft diameter precision (D) (Details P.1301)
※ Step R (Details P.1302)

Part Number	Head Thickness	T P
EPSHS□A	4mm(T4)	0 −0.005
EPSHSE□A		−0.01 −0.02

- Key flat is made on the standard 0° to determine the tip shape position.
- Key flat cutting position is (D/2+0.1).

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

H	Part Number			0.01mm increments		1mm increments	0.01mm increments
	Type	Tip shape	D	L	P	N	S
4	EPSHS (P $^{0}_{-0.005}$) EPSHSE (P $^{-0.01}_{-0.02}$)	1A 14A 27A	2	50.00～200.00	1.50～1.90	N≧15 and 20≦(L−N)≦150	5.00～40.00
5		2A 15A 28A 3A 16A 29A	2.5		1.50～2.40		
6		4A 17A 30A	3	50.00～250.00	1.50～2.90	N≧15 and 20≦(L−N)≦185	5.00～50.00
7		5A 18A 31A 6A 19A 32A	3.5		1.50～3.40		
		7A 20A	4		1.50～3.90		
8		8A 21A 9A 22A	4.5		2.50～4.40		
		10A 23A	5		3.00～4.90		
9		11A 24A 12A 25A	5.5		3.50～5.40		
		13A 26A	6		4.00～5.90		

Please select a tip shape of 1A～32A from P.181～184

Order

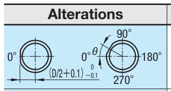
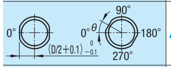
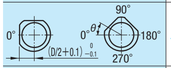
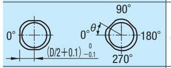
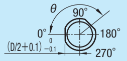
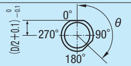
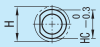
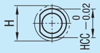
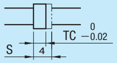
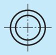
Part Number				L		P		N		S		Sequence of A・V・E・J・W・R・SR・F・G・K・Q
Type	Tip shape	D	—		—		—		—		—	
EPSHS	5A	5	—	60.00	—	P4.62	—	N30	—	S10.00	—	V2.4—F58—G30

Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	N	—	S	—	A・V・E・J・W・R・SR・F・G・K・Q	—	(AKC・AWC···etc.)
EPSHS5A 5	—	60.00	—	P4.62	—	N30	—	S10.00	—	R10—F130.00	—	AWC60

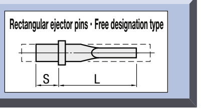
Alteration details P.174

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGB	KGB=1° increments 0<KGB<360	
	HC	HC=0.1mm increments D+1≦HC<H	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	TC	TC=0.1mm increments 2.0≦TC≦10 and TC≦N−10 (Dimensions L, N and S remain unchanged.)	
	NKC	Without key flat cutting Available for tip shapes 6A・9A・11A・12A・13A・30A Only available combination is with HC・HCC・TC	

Price Quotation

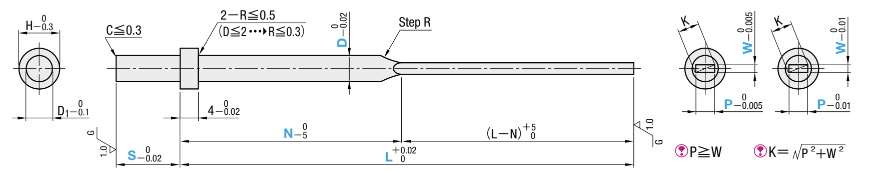
High Speed Steel
SKH51 equivalent

RECTANGULAR EJECTOR PINS WITH FREE FLANGE POSITION


Rectangular ejector pins · Free designation type
S
L

Non JIS material definition is listed on P.1351 - 1352

RoHS


H $-_{0.3}^{0}$
C≦0.3
2−R≦0.5
(D≦2⋯▸R≦0.3)
D $-_{0.02}^{0}$
Step R
$D_1 -_{0.1}^{0}$
4 $-_{0.02}^{0}$
N $-_{5}^{0}$
(L−N) $_{0}^{+5}$
G
1.0
S $-_{0.02}^{0}$
L $_{0}^{+0.02}$
ERSH
ERSHE
K
W $-_{0.005}^{0}$
W $-_{0.01}^{0}$
P $-_{0.005}^{0}$
P $-_{0.01}^{0}$

P≧W　$K=\sqrt{P^2+W^2}$

Part Number	Head Thickness	T P · W
ERSH	4mm (T4)	$-_{0.005}^{0}$
ERSHE		$-_{0.01}^{0}$

※ Range of guaranteed shaft diameter precision (Details P.1301)
※ Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

H	D1	Part Number		0.01mm increments				K	N	N
		Type	D	L	S	P	W	max.	1mm increments	min.
3	1	ERSH ERSHE	1	50.00～100.00	5.00～40.00	0.30～0.80	0.30～	0.9	30≦(L−N)≦50	23
	1.5		1.5			0.60～1.30		1.4		
4	2		2	50.00～200.00		0.80～1.80		1.9	30≦(L−N)≦150	
5	2.5		2.5			0.80～2.30		2.4		26
6	3		3		5.00～50.00	0.80～2.80		2.9		27
7	3.5		3.5			1.00～3.30		3.4		
	4		4			1.00～3.80		3.9		29
8	4.5		4.5			1.20～4.30	0.40～	4.4		
	5		5			1.50～4.80		4.9		31
9	5.5		5.5			1.80～5.30	0.50～	5.4		
	6		6			2.00～5.80		5.9		33

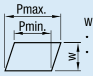
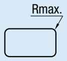
Designate P・W dimensions within the Kmax.　$K=\sqrt{P^2+W^2}$　P≧W

Order

Part Number — L — S — P — W — N
ERSH 5 — 150.00 — S10.00 — P3.00 — W2.00 — N80

Days to Ship Quotation

Price Quotation

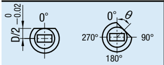
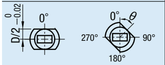
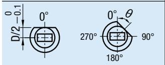
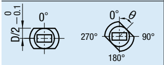
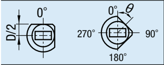
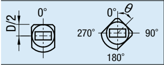
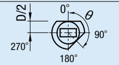
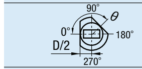
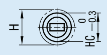
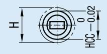
Precision Standard		
Squareness of the tip corner		W plane as the base ・ERSH　(Pmax.−Pmin.)≦0.01 ・ERSHE　(Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

Pmax.
Pmin.
W
Rmax.

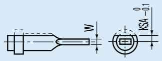
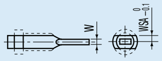
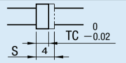
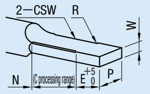
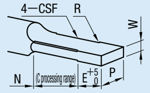
Alterations

Part Number — L — S — P — W — N — (HC・TC⋯etc.)
ERSH 5 — 150.00 — S10.00 — P3.00 — W2.00 — N80 — TC3.0

Alteration details P.174・P.195

Alterations	Code	Spec.	1Code
	VAK	VAK=45° increments 0≦VAK<360 ⊗ Combination with KSA/WSA not available.	Quotation
	VAW	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	

D/2 $-_{0.02}^{0}$
D/2 $-_{0.1}^{0}$
D/2
0°
90°
180°
270°
θ
H
HC $-_{0.3}^{0}$
HCC $-_{0.02}^{0}$

Alterations	Code	Spec.	1Code
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1 D≧1.5	Quotation
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1 D≧1.5	
	TC	TC=0.1mm increments 2.0≦TC≦4 (Dimensions L, N and S remain unchanged.)	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

W
KSA $-_{0.1}^{0}$
WSA $-_{0.1}^{0}$
TC $-_{0.02}^{0}$
S
4
2−CSW
4−CSF
R
N
(C processing range)
E $_{0}^{+5}$
P

CSW, CSF: Range of designation	
W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

Example

- Rectangular ejector pins with free flange positon can be ejected in differential time.
- The molding products can be slowly ejected by the depth of counter bore Z (Fig.1).

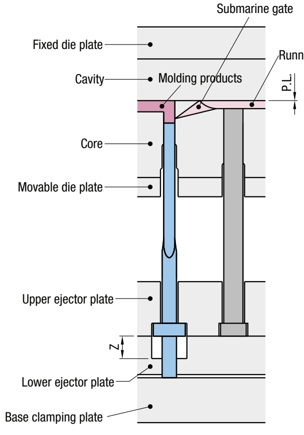

Submarine gate
Fixed die plate
Cavity
Molding products
Runner
P.L.
Core
Movable die plate
Upper ejector plate
Z
Lower ejector plate
Base clamping plate

Fig. 1・Mold closed

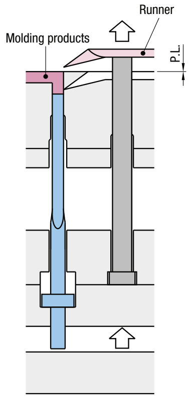

Runner
Molding products
P.L.

Fig. 2・Mold opening

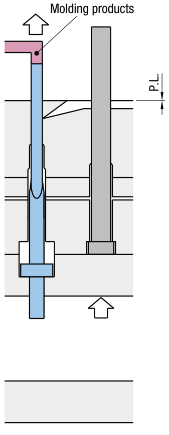
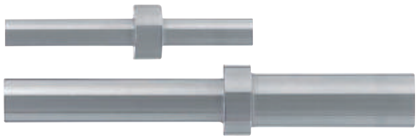
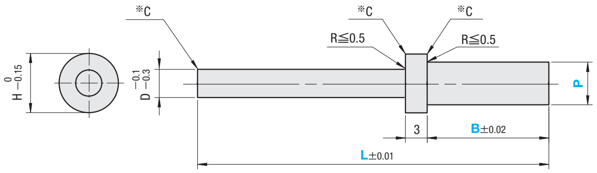

Molding products
P.L.

Fig. 3・Mold opened

PUSHER PINS WITH SPRING GUIDE




※C
※C
※C
R≦0.5
R≦0.5
H $^{0}_{-0.15}$
D $^{-0.1}_{-0.3}$
P
3
B±0.02
L±0.01

Part Number	T P
EPCH	$^{0}_{-0.005}$
EPCHE	$^{-0.01}_{-0.02}$

※C Performs C chamfering of 0.1mm or less on the head of upper and lower sides end of spring guide.

M SKH51 equivalent
H 58～60HRC

H	D	Part Number		0.01mm increments		U/Price
		Type	P	L	B	1～4
6	3	EPCH (P $^{0}_{-0.005}$) EPCHE (P $^{-0.01}_{-0.02}$)	2	18.00～45.00 L−(B+3)≧5	5.00～20.00	Quotation
			2.5			
			3			
			3.5	18.00～60.00 L−(B+3)≧5	5.00～40.00	
			4			
8	5		5			
			6			

L−(B+3)≧5

Order

Part Number	—	L	—	B
EPCH 2	—	30.00	—	B14.00
EPCHE 6	—	45.00	—	B21.25

Days to Ship Quotation

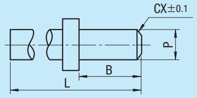
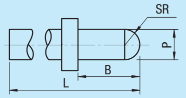
Price Quotation

Non JIS material definition is listed on P.1351 - 1352

Alterations

Part Number	—	L	—	B	—	(CX · SR)
EPCH 2	—	30.00	—	B14.00	—	CX 0.3

Alteration details P.174

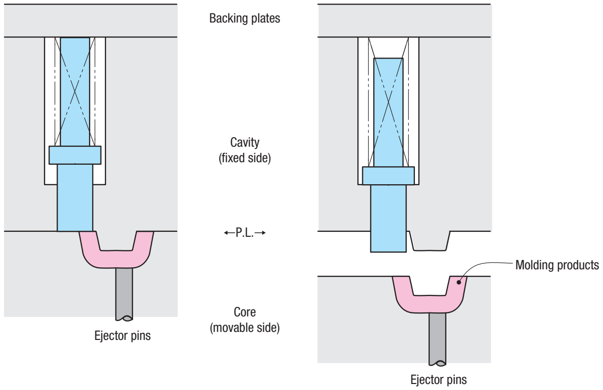
Alterations	Code	Spec.	1Code
	CX	Performs C chamfering on the tip. CX=0.1mm increments Designation method CX 0.3 0.3≦CX≦0.5 Available when B−CX≧10	Quotation
	SR	Finishes the top in spherical shape (SR). SR=P/2 Designation method SR Available when B−P/2≧10	

CX±0.1
P
B
L
SR
P
B
L

Example

1.For the molding product with wall relief on the fixed side, defective releasing might occur since molding product is pulled to a fixed side. In that case, pulling the mold product apart from a fixed side is effective.
The pusher pins with spring guide are used for such a usage.

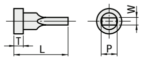
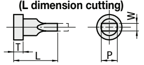
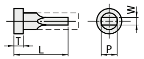
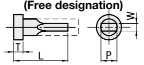
2.It can be used as suppression to prevent metallic insert from floating when the insert molding is done.


Backing plates
Cavity
(fixed side)
←P.L.→
Core
(movable side)
Molding products
Ejector pins
Ejector pins

For wire springs (WR・WF・WL), refer to **P.1223～1226**
Use when spring dia.≦H.
The plate hole on the spring guide side is recommended for (H+1)mm end milling.

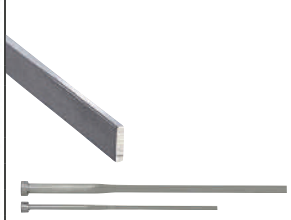
RECTANGULAR EJECTOR PINS

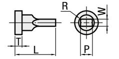
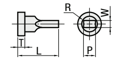
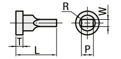
RECTANGULAR EJECTOR PINS

Category \ Type				Standard 		L dimension designation type (L dimension cutting) 		Free disignation type 		N dimension short type (Free designation) 	
Material		Head Thickness (T)	P・W Tolerance	Part Number	Page	Part Number	Page	Part Number	Page	Part Number	Page
SKH51 equivalent	Angular tip corner	4mm (T4)	0 —0.003	—		—		P—ERZF	P.213	—	
			0 —0.005	—		P—ERVL	P.207	P—ERVF	P.209	—	
		4mm (T4) Small diameter	0 —0.005	—		—		P—ERVYF	P.209	—	
	Normal	4mm (T4)	0 —0.003	—		—		ERZF	P.213	—	
			0 —0.005	ERVB	P.205	ERVL	P.207	ERVF	P.209	ERVSF	P.211
			0 —0.01	ERPH	P.197	ERL	P.199	ERF	P.201	ERSF	P.203
		4mm (T4) Small diameter	0 —0.005	—		—		ERVYF	P.209	—	
		4・6・8mm (JIS)	0 —0.005	ERVJB	P.205	ERVJL	P.207	ERVJ	P.209	ERVSJF	P.211
			0 —0.01	ERJ	P.197	ERJL	P.199	ERJF	P.201	ERSJF	P.203
		8mm (JIS)	0 —0.02	ERJXB	P.253	ERJXL	P.253	ERJX	P.255	—	
SKD61 equivalent＋Nitrided				ERNXB	P.259	ERNXL	P.259	ERNX	P.261	—	
Flat bar: SKH51 equivalent Shaft: SK4		6・8mm (JIS)		ERHK—B	P.265	ERHK—L	P.265	ERHK—F*	P.267	—	

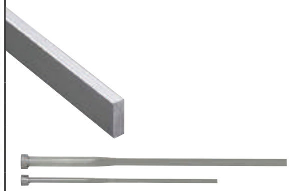
*W dimension for ERHK—F can be selected.

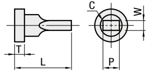
R-CHAMFERED RECTANGULAR EJECTOR PINS



Category \ Type			L dimension designation type (L dimension cutting) 		Free disignation type 		R position selection type (Free designation) 	
Material	Head Thickness (T)	P・W Tolerance	Part Number	Page	Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.005	ERVLWR ERVLFR	P.221	ERVWR ERVFR	P.223	ERV□□R	P.225
		0 —0.01	ERLWR ERLFR	P.215	ERWR ERFR	P.217	ER□□R	P.219
	4・6・8mm (JIS)	0 —0.005	—		ERVJWR ERVJFR	P.223	ERVJ□□R	P.225
		0 —0.01	—		ERJWR ERJFR	P.217	ERJ□□R	P.219
	8mm (JIS)	0 —0.02	—		ERJXWR ERJXFR	P.257	—	
SKD61 equivalent＋Nitrided	8mm (JIS)	0 —0.02	—		ERNXWR ERNXFR	P.275	—	

C-CHAMFERED RECTANGULAR EJECTOR PINS



Category \ Type			Free disignation type 	
Material	Head Thickness (T)	P・W Tolerance	Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.005	ERVF□□C	P.229
		0 —0.01	ERF□□C	P.227
	4・6・8mm (JIS)	0 —0.005	—	
		0 —0.01	ERJF□□C	P.227

■Characteristics of materials for straight ejector pins

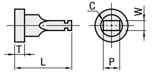
		M	High Speed Steel SKH51 (M2)(1.3343)	Dies Steel SKD61 (H13)(1.2344)＋Nitrided
		H HRC	58～60	Surface base: 900HV～ Material:40～45
Machining characteristics	Wear resistance		5	4
	Ability to be mirror-finished		4	3
	Toughness		3	4
	Corrosion resistance		3	3
Physical characteristics	Density	[g/cm³]	8.2	7.75
	Modulus of longitudinal elasticity	[kgf/mm²]	22300	21000
	Coefficient of thermal expansion	[×10⁻⁶/℃]	10.1	10.8
	Thermal conductivity	[cal/cm・sec・℃]	0.051	0.061
Mechanical characteristics	Tensile strength	[kgf/mm²]	235	135
	Charpy impact values	[kgf・m/cm²]	2	4

Machining characteristics 1 (Poor) — 3 (Good) — 5 (Excellent)

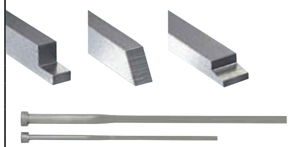
Conversion expression
$1\text{kgf/mm}^2 = 9.81\text{N/mm}^2$
1cal/cm・sec・℃＝418.6W/M.K
$1\text{kgf}\cdot\text{m/cm}^2 = 9.81\text{J/cm}^2$

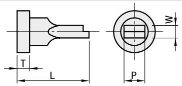
Data may vary depending on heat processing and working conditions; use the data as reference.

GAS RELEASE RECTANGULAR EJECTOR PINS

Category \ Type			Free disignation type 	
Material	Head Thickness (T)	P・W Tolerance	Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.005	GV—ERVF	P.233
		0 —0.01	GV—ERF	P.231
	4・6・8mm (JIS)	0 —0.005	GV—ERVJ	P.233
		0 —0.01	GV—ERJF	P.231

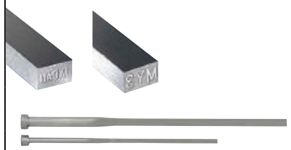
RECTANGULAR EJECTOR PINS WITH TIP PROCESS

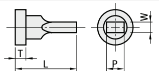


Category \ Type						
Material	Head Thickness (T)	P・W Tolerance	Free designation type		Rectangular Ejector Pins with Tip Process (Free designation)	
			Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.005	ERV□□	P.241	ERVWR□□ ERVFR□□	P.243
		0 —0.01	ER□□	P.237	ERWR□□ ERFR□□	P.239
	4・6・8mm (JIS)	0 —0.005	ERVJ□□	P.241	ERVJWR□□ ERVJFR□□	P.243
		0 —0.01	ERJ□□	P.237	ERJWR□□ ERJFR□□	P.239

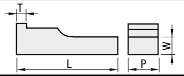
- For tip shapes, refer to **P.235・236**

RECTANGULAR EJECTOR PINS WITH ENGRAVING

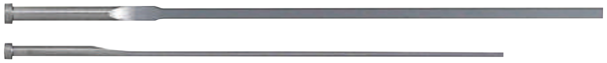


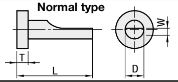
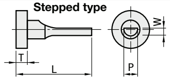
Category \ Type						
Material	Head Thickness (T)	P・W Tolerance	Free designation type		Rectangular Ejector Pins with Tip Process (Free designation)	
			Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.005	ERVF□M ERVF□MR	P.249	ERVWR□M ERVWR□MR ERVFR□M ERVFR□MR	P.251
		0 —0.01	ERF□M ERF□MR	P.245	ERWR□M ERWR□MR ERFR□M ERFR□MR	P.247

PRECISION RECTANGULAR EJECTOR PINS—RECTANGULAR SHANK TYPE—

Category \ Type				
Material	Head Thickness (T)	P・W Tolerance	One Step	
			Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.005	ERSRP	P.269

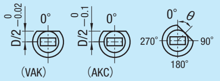
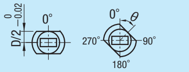
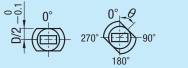
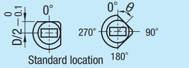
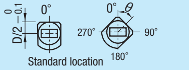
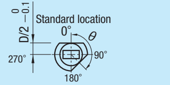
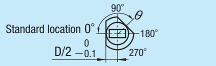
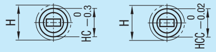
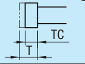
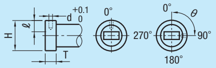
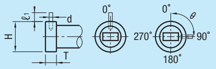
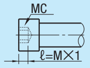
D-SHAPED EJECTOR PINS



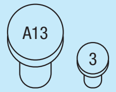
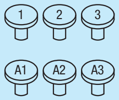
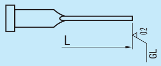
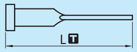
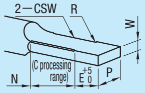
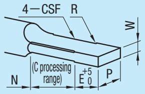
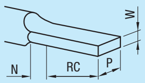
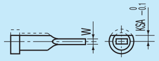
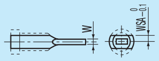
Category \ Type			Normal type 		Stepped type 	
Material	Head Thickness (T)	D・P・W Tolerance	Part Number	Page	Part Number	Page
SKH51 equivalent	4mm (T4)	0 —0.01	ERDP	P.271	ERDF	P.271
	4・6・8mm (JIS)		ERDPJ	P.271	ERDFJ	P.271

ALTERATION GUIDE FOR RECTANGULAR EJECTOR PINS

■Alteration Guide for Rectangular Ejector Pins and D-shaped Ejector Pins

Items	Applicable Products	Alterations	Codes	Specifications	1Code
Head alteration	Rectangular Ejector Pins & D-shaped Ejector Pins	**Key flat cutting (angled)**  D/2 $^{0}_{-0.02}$ 0° (VAK) D/2 $^{0}_{-0.1}$ 0° (AKC) 0° θ 270° 90° 180°	**VAK** (Precision) **AKC**	Changes the flat position clockwise from the standard position (standard: 0°). Range of designation 0≦VAK or AKC<360 Unit of designation (VAK) (AKC) Designation method θ =0° ···› VAK0 AKC0 45° increments 1° increments θ =45° ···› VAK45 AKC45 ❗(P—)ERVYF 90° increments ⊗ VAK not available for R-chamfered/C-chamfered/With tip process/D-shaped/With engraving type.	
		Precision key flat cutting (angled) 	**VAW**	Adds two parallel flats at the standard (0°) position, or at the designated angle (clockwise in 45° increments from the standard position). Range of designation 0≦VAW<360 Unit of designation 45° increments ❗(P—)ERVYF 90° increments Designation method θ =0° ···› VAW0, θ =45° ···› VAW45 ⊗ Not available for R-chamfered/C-chamfered/With tip process/D-shaped/With engraving type.	
		Key flat cutting (angled) 	**AWC**	Adds two parallel flats at the standard (0°) position, or at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0≦AWC<360 Unit of designation 1° increments ❗(P—)ERVYF 90° increments Designation method θ =0° ···› AWC0, θ =45° ···› AWC45	
		Key flat cutting (angled)  D/2 $^{0}_{-0.1}$ 0° 0° θ 270° 90° Standard location 180°	**ARC**	Adds two right-angled flats at the standard (0°) position, moreover at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0≦ARC<360 Unit of designation 1° increments ⊗(P—) ERVYF not available. Designation method θ =0° ···› ARC0, θ =45° ···› ARC45	
		Key flat cutting (angled)  D/2 $^{0}_{-0.1}$ 0° 0° θ 270° 90° Standard location 180°	**ADC**	Adds three flats at the standard (0°) position, moreover at the designated angle (clockwise in 1° increments from the standard position). Range of designation 0≦ADC<360 Unit of designation 1° increments ⊗(P—) ERVYF not available. Designation method θ =0° ···› ADC0, θ =45° ···› ADC45	
		Key flat cutting (angled)  D/2 $^{0}_{-0.1}$ Standard location 0° θ 270° 90° 180°	**KGA**	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position), so that two flats are added totally. Range of designation 0<KGA<360 ⊗(P—) ERVYF not available. Unit of designation 1° increments Designation method θ =135° ···› KGA135	Quotation
		Key flat cutting (angled)  90° θ Standard location 0° 180° D/2 $^{0}_{-0.1}$ 270°	**KGD**	Adds a flat at the standard (0°) position and another at the designated angle (clockwise in 1° increments from the standard position), so that two flats are added totally. ❗ Please note that standard position 0° is different from other alterations as per the drawing in the left. Range of designation 0<KGD<360 Unit of designation 1° increments ⊗(P—)ERVYF not available. Designation method θ =135° ···› KGD135	
		Head diameter change 	**HC** **HCC** (Precision)	Reduces the head diameter. Range of designation D+1≦HC<H and D≧1.5 D+1≦HCC<H—0.3 and D≧1.5 Unit of designation 0.1mm increments Designation method HC6.5 HCC6.1	
		Head thickness change 	**TC**	Reduces the head thickness. Dimension L remains unchanged except blank type. Range of designation T/2≦TC<T ❗Available when D≧1.5 ❗T—TC≦Lmax.—L	
		Dowel hole boring  d $^{+0.1}_{0}$ ℓ H T 0° 0° θ 270° 90° 180°	**NC**	Dowel hole boring Adds a dowel hole for use with WSP and MS. Range of designation 0≦NC<360 Unit of designation 90° increments Designation method θ =0° ···› NC0, θ =90° ···› NC90 ❗Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ 4 / 2 / 3 6 / 3 / 5 8 / / 10 / 4 /	
		Dowel hole+Spring pin 	**NCW**	Dowel hole boring and spring pin driving. Range of designation 0≦NCW<360 Unit of designation 90° increments Designation method θ =0° ···› NCW0, θ =90° ···› NCW90 ❗Available when head diameter H≧4 ⊗ Combination with other than NHC・NHN not available. T / d / ℓ1 / Spring pin 4 / 2 / 5 / WSP2 6 / 3 / / WSP3 8 / / / 10 / 4 / / WSP4	
		Tapping 	**MC**	Creates a tap on the head. Designation method MC When D8.00～9.99 M4 When D10.00～11.99 M5 When D12.00～15.00 M6 ⊗ Combination with key flat cutting or NHC/NHN/HC/HCC not available. Available when D≧8, H≧13, T≧8. ⊗ Not Available for Caulking/Rectangular shank type	

■Alteration Guide for Rectangular Ejector Pins and D-shaped Ejector Pins

Items	Applicable Products	Alterations	Codes	Specifications	1Code
Head alteration	Rectangular Ejector Pins & D-shaped Ejector Pins	**Numbering** 	**NHC**	Numbering on the head Electrolytic marking of ID code on the head(in 5 point, Round Gothic type). Available characters Numerals: 0～9; Alphabets: A～Z Range of designation 1 character when 2≦H<4.9, 1 or 2 characters when 5≦H<6.9 (Only the first character may be an alphabet.) Up to 3 characters when 7≦H (Only the first character may be an alphabet.) Designation method NHC—6. NHC—23. NHC—A90 ⊗ Combination with MC not available. ❗Available when head diameter H≧2 ⊗ Not Available for Caulking/Rectangular shank type	
		Numbering 	**NHN**	Automatic sequential numbering on the head Adds a sequential number on the head of each ejector pin when two or more pieces of identical size are ordered. Range of designation Same as NHC (see above) Unit of designation Same as NHC (see above) Designation method When 3 pieces are ordered with NHN—1: A sequential number starting from 1 to 3 is added on the head of each piece. When 10 pieces are ordered with NHN—A15: A sequential number starting from A15 (through A24) is added on the head of each piece. ⊗ Combination with MC not available. ❗Available when head diameter H≧2 ❗ Only available when two or more pieces of identical size are ordered. ⊗ Not Available for Caulking/Rectangular shank type	
Tip alteration		**Lapping on the tip face** 	**TMC**	Performs lapping on the tip face. ❗Available for L and L・P・W dimension designation types. ❗Available when P≧0.6 ⊗ Not available for (P—), ERVYF/For large size/Caulking type/Rectangluar shank type. Designation method TMC	
Total length alteration	Rectangular Ejector Pins	**L dimension tolerance alteration** 	**LKC**	L dimension tolerance $^{+0.02}_{0}$ can be changed to $^{+0.01}_{0}$. ❗Available when L≦200, and for free designation type Designation method LKC	Quotation
Flat bar alteration		**C relief processing (2 points on top)**  2—CSW R W N (C processing range) E $^{+5}_{0}$ P	**CSW**	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1—E25 CSW, CSF: Range of designation W / CSW, CSF 1.0≦W<1.5 / 0.3 W≧1.5 / 0.5 1 1.5 ❗P≧1.5 ❗CSW, CSF<W/2 E=1mm increments ❗5≦E≦(L—N)—20 ❗When E<20, R process range = E. When E≧20, straight part sometimes remains between R and C processing range. ⊗ Not available for Blank/Caulking/Rectangular shank type.	
		C relief processing (4 points)  4—CSF R W N (C processing range) E $^{+5}_{0}$ P	**CSF**	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5—E30	
		R-chamfering length change (Only applicable to R-chamfered precision type) 	**RC**	Changes the length of R-chamfered part ❗5≦RC≦(L—N)—30 and RC≦40 RC=1mm increments Adds RC recess processing at all places R-chamfered. Designation method RC25	
Shaft alteration		**Shoulder cutting (1 plate)** 	**KSA**	Performs shoulder cutting (1 plane) on the shaft diameter (D). Range of designation W/2+0.1≦KSA≦D/2—0.1 ❗Available when D≧1.5 Unit of designation 0.1mm increments Designation method KSA5.3 ⊗ Not Available for Caulking/Rectangular shank type	
		Shoulder cutting (2 parallel plates) 	**WSA**	Performs shoulder cutting (2 parallel planes) on the shaft diameter (D). Range of designation W/2+0.1≦WSA≦D/2—0.1 ❗Available when D≧1.5 Unit of designation 0.1mm increments Designation method WSA6.2 ⊗ Not Available for Caulking/Rectangular shank type	

High Speed Steel SKH51 equivalent	P・W $^{0}_{-0.01}$ Blank

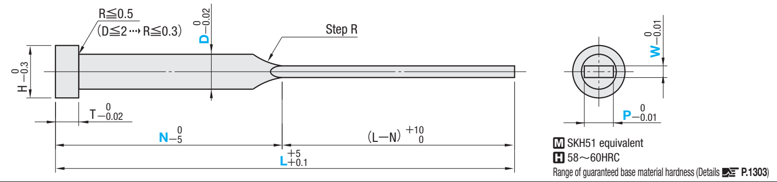
RECTANGULAR EJECTOR PINS

— STANDARD —

RoHS

Part Number	Head Thickness	T P・W
ERPH	4mm(T4)	$^{0}_{-0.01}$
ERJ	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

Part Number	—	L	—	P	—	W	—	N
ERJ8	—	120	—	P6.0	—	W1.0	—	N60

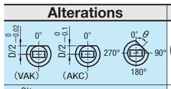
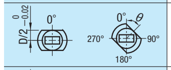
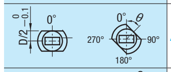
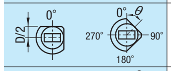
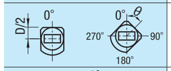
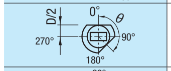
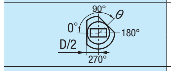
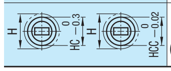
Days to Ship Quotation

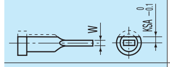
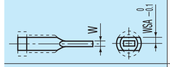
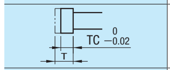
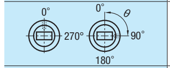
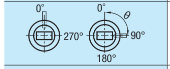
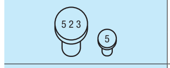
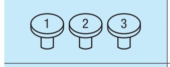
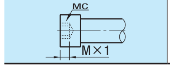
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC⋯etc.)
ERJ 8	—	120	—	P6.0	—	W1.0	—	N60	—	AKC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK (precision) AKC	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only.	
	VAW	VAW=45° increments 0≦VAW<360 Combination with KSA/WSA not available.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC (precision)	HC, HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	

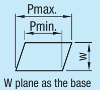
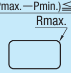
Alterations	Code	Spec.	1Code
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T Dimensions L and N become shorter by (T−TC)	
	NC	Dowel hole boring NC=90° increments Available when H≧4 Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	Quotation
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	MC	Tapping D8・8.5 ⋯ M4 D10・10.5 ⋯ M5 D12 ⋯ M6 Not available for ERPH. Available when D≧8	

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			L	P	W	N
H	T	H	T	4mm head	JIS head	D				
3	4	—	—	ERPH (4mm head)	—	1.5	100	0.8 1.0 1.2	0.3 0.4 0.5 0.6	40 50 60
							150			50 60 70 80
4						2	100	1.0	0.4 0.5 0.6 0.7 0.8 1.0	30 40 50 60
							150	1.2		40 50 60 70 80
							200	1.5		60 70 80
5						2.5	100	1.5 (2.0)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5)	30 40 50 60
							150			40 50 60 70 80
							200			60 70 80 90 100
6						3	100	2.0 (2.5)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5) (2.0)	40 50 60
							150			40 50 60 70 80 90
							200			60 70 80 100 120
7						3.5	100	2.5 (3.0)	0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5 (2.0)	40 50 60
							150			40 50 60 70 80
							200			60 70 80 100
							250			80 100
		8	6		ERJ (JIS Head)	4	100	3.0 (3.5)	0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5 (2.0)	40 50 60
							(120)			40 50 60 70
							150			40 50 60 70 80 90
							200			60 70 80 100 120
							250			80 100
8						4.5	100	3.5 (4.0)	0.6 0.7 0.8 0.9 1.0 1.2 1.5 1.8 (2.0) (2.5)	40 50 60 70
							120			40 50 60 70
							150			40 50 60 70
							200			60 70 80 90 100
							250			90 100 120
		9				5	100	4.0	0.6 0.7 0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60 70
							(120)			40 50 60 70
							150			40 50 60 70 80 90
							(175)			60 70 80
							200			60 70 80 100
							250			100 120
9						5.5	100	4.5 (5.0)	0.8 0.9 1.0 1.2 1.5 1.8 2.0 (2.5)	40 50 60 70
							120			40 50 60 70
							150			40 50 60 70
							175			60 70
							200			60 70 80 100
							250			100 120
		10				6	(120)	5.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5 3.0	40 50 60 70
							150			40 50 60 70 80
							(175)			60 70 80
							200			60 70 80 90 100
							250			90 100 120
10		11				6.5	150	6.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0	40 50 60
							200			70 80
							250			100
						7	120	6.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60
							150			40 50 60
							175			60 70
							200			60 70 80 100
							250			100 120 160
							(300)			150 180
11		13	8			8	(120)	6.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60
							150			40 50 60
							(175)			60 70
							200			60 70 80 100
							250			100 120 130 160
							(300)			150 180
14		14				8.5	150	7.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50
							200			80 100
							250			100
							(300)			150 180
15		15				10	(120)	8.0	0.8 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60
							(150)			50 60
							(175)			60 70
							200			80 100
							250		1.0 1.2 1.5 1.8 2.0 2.5	100 120 130 160
							(300)			100 120 150 180
17		17				10.5	150	10.0	1.2 1.5 2.0	40 50
							200			80 100
							250			100
							(300)			150 200
—	—			—		12	150	10.0	1.2 1.5 1.8 2.0	40 60
							200			80 100
							250			100
							300			100 150

L(120)(150)(175)(300) are available only for ERJ. Selections in which both the P and W dimensions are enclosed in brackets ( ) cannot be made.

Price Quotation

Precision Standard	
Squareness of the tip corner	 W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner	 Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

High Speed Steel
SKH51 equivalent

P・W$^{0}_{-0.01}$
L dimension
designation

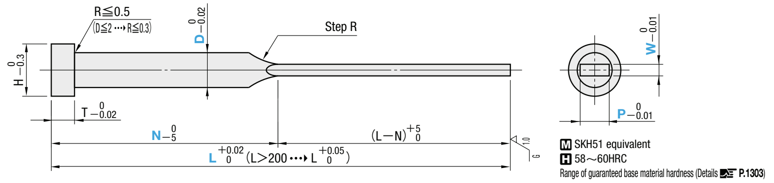
RECTANGULAR EJECTOR PINS

— L DIMENSION DESIGNATION TYPE —

RoHS

Part Number	Head Thickness	T P・W
ERL	4mm(T4)	$^{0}_{-0.01}$
ERJL	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



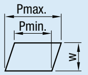
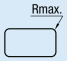
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

Part Number	—	L	—	P	—	W	—	N
ERJL8	—	185.05	—	P6.0	—	W1.0	—	N80

Days to Ship Quotation

Precision Standard

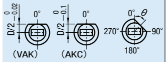
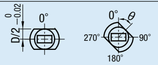
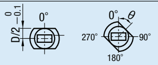
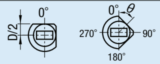
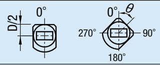
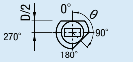
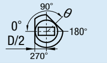
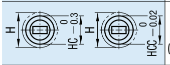
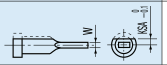
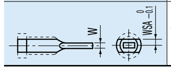
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

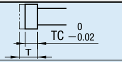
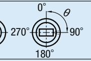
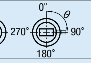
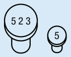
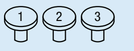
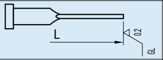
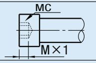
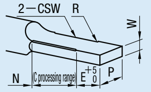
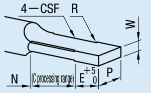
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC⋯etc.)
ERJL 8	—	185.05	—	P6.0	—	W1.0	—	N80	—	AKC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
 D/2 $^{0}_{-0.02}$ D/2 $^{0}_{-0.1}$ 0° 270° 90° 180° θ (VAK) (AKC)	VAK (precision) AKC	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 ⊗ (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only.	
	VAW	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC (precision)	HC, HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T Dimensions N becomes shorter by (T−TC). (Dimension L remains unchanged.) T−TC≦Lmax.−L	
	NC	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	Quotation
	TMC	Lapping on the tip face	
	MC	Tapping D8・8.5⋯M4 D10・10.5⋯M5 D12⋯M6 ⊗ Not available for ERL Available when D≧8 Only available combination is with CSW・CSF・TMC	
(C recess processing at 2 points on top)  2−CSW R W N (C processing range) E $^{+5}_{0}$ P	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points)  4−CSF R W N (C processing range) E $^{+5}_{0}$ P	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number 4mm head	Part Number JIS head	D	L 0.01mm increments	P	W	N
3	4	—	—	ERL (4mm head)	—	1.5	50.00～100.00	0.8 1.0 1.2	0.3 0.4 0.5 0.6	40 50 60
							100.01～150.00			50 60 70 80
4						2	50.00～100.00	1.0 1.2 1.5	0.4 0.5 0.6 0.7 0.8 1.0	30 40 50 60
							100.01～150.00			40 50 60 70 80
							150.01～200.00			60 70 80
5						2.5	50.00～100.00	1.5 (2.0)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5)	30 40 50 60
							100.01～150.00			40 50 60 70 80
							150.01～200.00			60 70 80 90 100
6						3	50.00～100.00	2.0 (2.5)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5) (2.0)	40 50 60
							100.01～150.00			40 50 60 70 80 90
							150.01～200.00			60 70 80 100 120
7						3.5	50.00～100.00	2.5 (3.0)	0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5 (2.0)	40 50 60
							100.01～150.00			40 50 60 70 80
							150.01～200.00			60 70 80 100
							200.01～250.00			80 100
		8	6		ERJL (JIS Head)	4	50.00～100.00	3.0 (3.5)	0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5 (2.0)	40 50 60
							100.01～150.00			40 50 60 70 80 90
							150.01～200.00			60 70 80 100 120
							200.01～250.00			80 100
8						4.5	50.00～100.00	3.5 (4.0)	0.6 0.7 0.8 0.9 1.0 1.2 1.5 1.8 (2.0) (2.5)	40 50 60 70
							100.01～150.00			
							150.01～200.00			60 70 80 90 100
							200.01～250.00			90 100 120
		9				5	50.00～100.00	4.0	0.6 0.7 0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60 70
							100.01～150.00			40 50 60 70 80 90
							150.01～200.00			60 70 80 100
							200.01～250.00			100 120
9						5.5	50.00～100.00	4.5 (5.0)	0.8 0.9 1.0 1.2 1.5 1.8 2.0 (2.5)	40 50 60 70
							100.01～150.00			
							150.01～200.00			60 70 80 100
							200.01～250.00			100 120
		10				6	50.00～100.00	5.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5 3.0	40 50 60 70
							100.01～150.00			40 50 60 70 80
							150.01～200.00			60 70 80 90 100
							200.01～250.00			90 100 120
10		11				6.5	50.00～100.00	6.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0	40 50 60
							100.01～150.00			
							150.01～200.00			70 80
							200.01～250.00			100
						7	50.00～100.00	6.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60
							100.01～150.00			
							150.01～200.00			60 70 80 100
							200.01～250.00			100 120 160
							(250.01～300.00)			150 180
11		13	8			8	50.00～100.00	6.0 7.0 7.5	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60
							100.01～150.00			40 50 60
							150.01～200.00			60 70 80 100
							200.01～250.00			100 120 130 160
							(250.01～300.00)			150 180
14		14				8.5	50.00～100.00	7.0 8.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5	40 50
							100.01～150.00			
							150.01～200.00			80 100
							200.01～250.00			100
							(250.01～300.00)			150 180
15		15				10	50.00～100.00	8.0	0.8 1.0 1.2 1.5 1.8 2.0 2.5	40 50 60
							100.01～150.00			40 50 60 80
							150.01～200.00			60 70 80 100
							200.01～250.00		1.0 1.2 1.5 1.8 2.0 2.5	100 120 130 160
							(250.01～300.00)			100 120 150 180
17		17				10.5	50.00～100.00	10.0	1.2 1.5 2.0	40 50
							100.01～150.00			
							150.01～200.00			80 100
							200.01～250.00			100
							(250.01～300.00)			150 200
—	—			—		12	100.00～150.00	10.0	1.2 1.5 1.8 2.0	40 60
							150.01～200.00			80 100
							200.01～250.00			100
							250.01～300.00			100 150

L(250.01～300.00) is standard dimension only for ERJL. ⊗ Selections in which both the P and W dimensions are enclosed in brackets ( ) cannot be made. L−N≧10

Price Quotation

Rectangular Ejector Pins

High Speed Steel
SKH51
equivalent

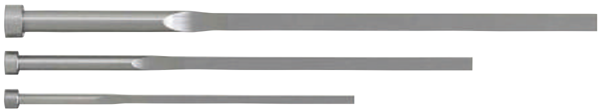
P・W$^{0}_{-0.01}$
L dimension
designation

High Speed Steel
SKH51 equivalent

P・W$^{0}_{-0.01}$
Free designation

RECTANGULAR EJECTOR PINS

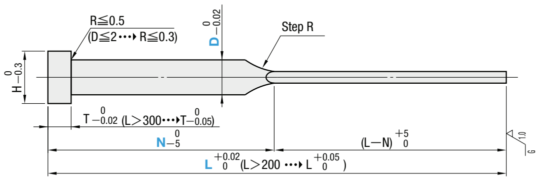
— FREE DESIGNATION TYPE —

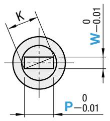


RoHS

Part Number	Head Thickness	🅃 P・W
ERF	4mm(T4)	$^{0}_{-0.01}$
ERJF	4・6・8mm(JIS)	

❗ Range of guaranteed shaft diameter precision (D) (**Details ☞ P.1301**)
❗ Step R (**Details ☞ P.1302**)





❗P≧W
❗$K=\sqrt{P^2+W^2}$

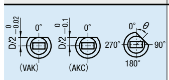
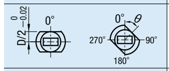
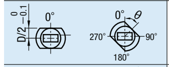
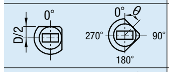
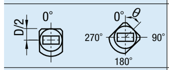
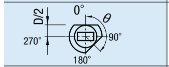
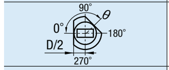
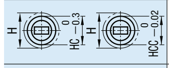
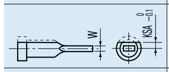
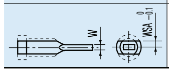
🄼 SKH51 equivalent
🄷 58～60HRC
Range of guaranteed base material hardness
(**Details ☞ P.1303**)

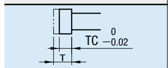
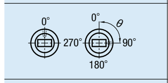
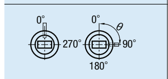
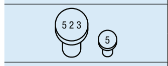
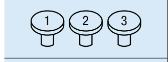
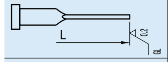
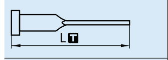
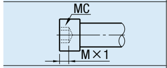
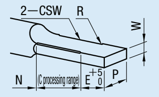
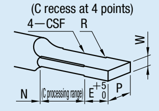
Alterations

☎ Part Number — L — P — W — N — (AKC・AWC···etc.)
ERF5 — 120.25 — P3.50 — W1.50 — N60 — AWC60

🚚 Quotation

Alteration details ☞ P.195

Alterations	Code	Spec.	1Code
	**VAK** (precision) **AKC**	VAK=45° increments AKC=1° increments ❗ 0≦VAK or AKC<360 ⊗ (VAK) KSA, WSA not available ❗ (AKC) When combined with KSA/WSA, 90° increments only.	
	**VAW**	VAW=45° increments ❗ 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	**AWC**	AWC=1° increments ❗ 0≦AWC<360 ❗ When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments ❗ 0≦ARC<360 ❗ When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments ❗ 0≦ADC<360 ❗ When combined with KSA/WSA, 90° increments only.	Quotation
	**KGA**	KGA=1° increments ❗ 0<KGA<360	
	**KGD**	KGD=1° increments ❗ 0<KGD<360	
	**HC** **HCC** (precision)	HC, HCC=0.1mm increments ❗ (HC) D+1≦HC<H,D≧1.5 ❗ (HCC)D+1≦HCC<H−0.3, D≧1.5	
	**KSA**	KSA=0.1mm increments ❗ W/2+0.1≦KSA≦D/2−0.1 ❗ D≧1.5	
	**WSA**	WSA=0.1mm increments ❗ W/2+0.1≦WSA≦D/2−0.1 ❗ D≧1.5	

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments ❗ T/2≦TC<T (Dimensions L and N remain unchanged.) ❗ T−TC≦Lmax.−L,D≧1.5	
	**NC**	Dowel hole boring NC=90° increments ❗ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. ※How to order and detailed specifications ☞ P.195	
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments ❗ Available when H≧4 ⊗ Combination with other than NHC・NHN not available. ※How to order and detailed specifications ☞ P.195	
	**NHC**	Numbering on the head ※How to order and detailed specifications ☞ P.196	
	**NHN**	Automatic sequential numbering on the head ※How to order and detailed specifications ☞ P.196	Quotation
	**TMC**	Lapping on the tip face ❗ Available when P≧0.6 ❗ Available when L−N≦31	
	**LKC**	L dimension tolerance alteration L$^{+0.02}_{0}$ ···▸ $^{+0.01}_{0}$ ❗ Available when L≦200	
	**MC**	Tapping D8・8.5 ···▸ M4 D10・10.5 ···▸ M5 D12・15 ···▸ M6 ⊗ Not available for ERF ❗ Available when D≧8 ❗ Only available combination is with CSW・CSF・TMC	
(C recess processing at 2 points on top) 	**CSW**	C-chamfering processing at 2 corners of the blade (except tip) for relief. Designation method CSW1—E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 → CSW,CSF: 0.3 W: W≧1.5 → CSW,CSF: 0.5, 1, 1.5	
(C recess at 4 points) 	**CSF**	C-chamfering processing at 4 corners of the blade (except tip) for relief. Designation method CSF0.5—E30 ❗ P≧1.5 ❗ CSW,CSF<W/2 E=1mm increments ❗ 5≦E≦(L−N)−20	

❗ Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number 4mm head	Part Number JIS head	D	0.01mm increments L	0.01mm increments P	0.01mm increments W	Kmax.	N 1mm increments	Nmin.
3	4	—	—	**ERF** (4mm head)	—	1.1	40.00～200.00	0.30～ 0.90	0.20～	1.0	10≦(L−N)≦150	23
						1.2		0.30～ 1.00		1.1		
						1.3		0.30～ 1.10		1.2		
						1.4		0.30～ 1.20		1.3		
		3	4		**ERJF** (JIS head)	1.5	40.00～250.00	0.50～ 1.30	0.30～	1.4	10≦(L−N)≦250	
4		4				2	40.00～300.00	0.80～ 1.80		1.9		
5		5				2.5		0.80～ 2.30		2.4		26
6		6				3	40.00～350.00	0.80～ 2.80		2.9		27
7		7				3.5		1.00～ 3.30		3.4		
		8	6			4		1.00～ 3.80		3.9		29
8						4.5		1.20～ 4.30		4.4		
		9				5	50.00～350.00	1.50～ 4.80	0.40～	4.9		31
9						5.5		1.80～ 5.30		5.4		
		10				6		2.00～ 5.80	0.50～	5.9		33
10		11				6.5		2.00～ 6.30		6.4		40
						7		2.30～ 6.80		6.9		
11		13	8			8		2.30～ 7.80		7.9		
14		14				8.5		2.30～ 8.30		8.4		
15		15				10		3.00～ 9.80		9.9		
17		17				10.5		3.00～10.30		10.4		
						12		3.50～11.80	0.80～	11.9		
—	—	20		—		15		3.50～14.80	1.00～	14.9		

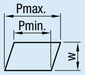
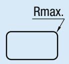
❗ Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ ❗ P≧W

☎ **Order**

Part Number — L — P — W — N
ERF5 — 120.25 — P3.50 — W1.50 — N60

🚚 **Days to Ship** Quotation

🄿 **Price** Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) ❗ The tip corners have been slightly trimmed to measure the P・W dimensions. **Details ☞ P.1313**

High Speed Steel
SKH51 equivalent

P・W $^{0}_{-0.01}$
Free designation

RECTANGULAR EJECTOR PINS

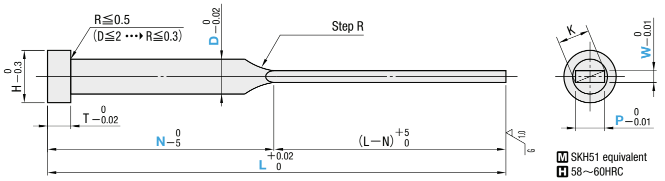
—N DIMENSION SHORT TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	Head Thickness	T P・W
ERSF	4mm(T4)	$^{0}_{-0.01}$
ERSJF	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details: see below of the right page)



P≧W
$K=\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

4mm head		JIS head		Part Number			0.01mm increments			Kmax.	N 1mm increments	Nmin.
H	T	H	T	4mm head	JIS head	D	L	P	W			
3	4	3	4	**ERSF** (4mm head)	**ERSJF** (JIS Head)	1.5	40.00～100.00	0.60～ 1.30	0.30～	1.4	10≦(L−N)≦80	20
4		4				2		0.80～ 1.80		1.9		
5		5				2.5		1.00～ 2.30	0.40～	2.4		23
6		6				3		1.00～ 2.80		2.9		25
7		7				3.5		1.20～ 3.30	0.50～	3.4		
		8	6			4	40.00～120.00	1.50～ 3.80		3.9	10≦(L−N)≦90	27
8						4.5		1.50～ 4.30		4.4		
		9				5	50.00～150.00	1.80～ 4.80		4.9	10≦(L−N)≦120	29
9						5.5		2.00～ 5.30		5.4		
		10				6		2.00～ 5.80	0.60～	5.9		31
10		11				6.5		2.50～ 6.30		6.4		35
						7		2.50～ 6.80		6.9		
11		13	8			8		3.00～ 7.80		7.9		
15		15				10		3.00～ 9.80	0.80～	9.9		
—	—	17		—		12	50.00～200.00	4.00～11.80	1.00～	11.9	10≦(L−N)≦165	

Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ P≧W

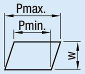
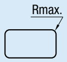
Order

Part Number	—	L	—	P	—	W	—	N
ERSF 1.5	—	100.00	—	P0.60	—	W0.30	—	N20

Days to Ship Quotation

Price Quotation

Precision Standard

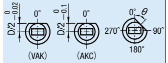
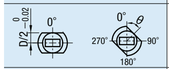
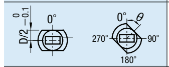
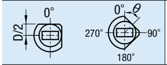
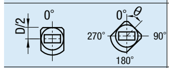
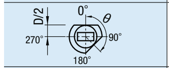
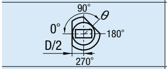
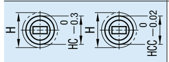
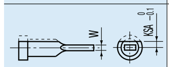
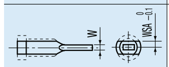
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

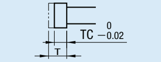
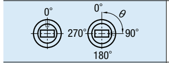
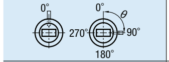
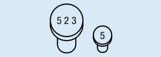
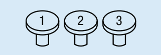
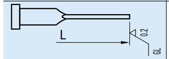
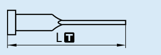
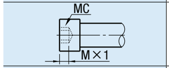
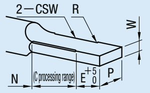
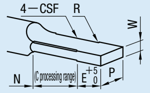
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC···etc.)
ERSF 1.5	—	100.00	—	P0.60	—	W0.30	—	N20	—	AWC60

Quotation

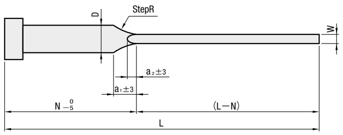
Alteration details P.195

Alterations	Code	Spec.	1Code
	**VAK** (precision) **AKC**	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 ⊗ (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only.	
	**VAW**	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	**AWC**	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC** **HCC** (precision)	HC, HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	**KSA**	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	**WSA**	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimension L and N remain unchanged.) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NHC**	Numbering on the head How to order P.196	
	**NHN**	Automatic sequential numbering on the head How to order P.196	
	**TMC**	Lapping on the tip face	Quotation
	**LKC**	L dimension tolerance alteration $L^{+0.02}_{0}$ ···▸ $^{+0.01}_{0}$ Available when L≦200	
	**MC**	Tapping D8 ···▸ M4 D10 ···▸ M5 D12 ···▸ M6 ⊗ Not available for ERSF Available when D≧8 Only available combination is with CSW・CSF・TMC	
(C recess processing at 2 points on top) 	**CSW**	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25 CSW, CSF: Range of designation W / CSW, CSF 1.0≦W<1.5 / 0.3 W≧1.5 / 0.5 1 1.5	
(C recess at 4 points) 	**CSF**	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20	

■ Step R of Rectangular Ejector Pins -N dimension short type-

For N short type, Step R becomes smaller comparing with that of conventional rectangular ejector pin.



- Step radius (R): R65～75*

(*This is the size of grindstone used to process R section. This is not a guaranteed value for R.)

- Formula used for calculating the length (a_1) and (a_2) of step R:

$$a_1=5+\sqrt{\frac{D-W}{2}\times\left(2R-\frac{D-W}{2}\right)}$$

$$a_2=5+\sqrt{\frac{D-P}{2}\times\left(2R-\frac{D-P}{2}\right)}$$

*The left formulas include profile error from rough and finish processing.

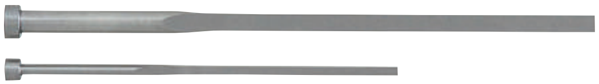
- Concentricity of the rectangular tip section (P・W) and shaft diameter (D): 0.2mm or less

High Speed Steel
SKH51 equivalent

Precision
P・W $_{-0.005}^{0}$
Blank

PRECISION RECTANGULAR EJECTOR PINS

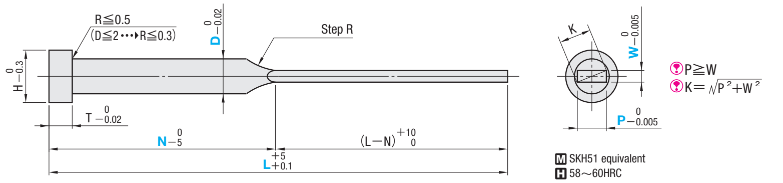
—STANDARD—



RoHS

Part Number	Head Thickness	T P・W
ERVB	4mm(T4)	$_{-0.005}^{0}$
ERVJB	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
$K=\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

Part Number	—	L	—	P	—	W	—	N
ERVB 4	—	100	—	P3.0	—	W2.0	—	N40

Days to Ship Quotation

■Express T applicable sizes

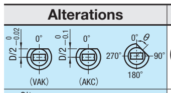
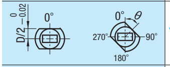
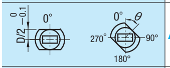
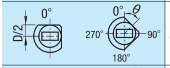
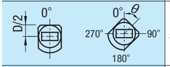
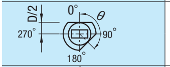
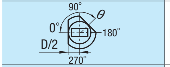
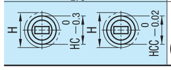
Part Number	D	L	P	W	N
ERVB (Head Thickness 4mm)	1.5	100	1.0 1.2	0.4 0.5	50
	2	100	1.2 1.5	0.4 0.5 0.6	50
		150			60
	2.5	150	2.0	0.5 0.6 0.7 0.8	60
		200			70
	3	150	2.5	0.7 0.8 1.0	50 60
		200			70
	3.5	150	3.0	0.8 1.0	50 60
		200			70

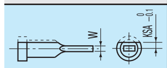
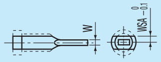
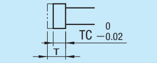
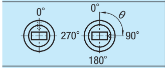
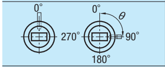
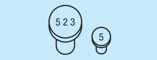
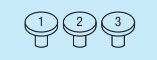
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC…etc.)
ERVB 4	—	100	—	P3.0	—	W2.0	—	N40	—	AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK (precision) AKC	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 ⊗ (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only.	
	VAW	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC (precision)	HC,HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	

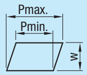
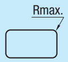
Alterations	Code	Spec.	1Code
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T Dimensions L and N become shorter by (T−TC)	
	NC	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	Quotation
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	

Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number 4mm head	Part Number JIS head	D	L	P	W	N
3	4	—	—	**ERVB** (4mm head)	—	1.5	100	0.6 0.7 0.8 1.0 (1.2)	0.3 0.4 0.5 0.6 (0.8)	40 50 60
							150			50 60 70 75 80 90 100
4						2	100	1.0 1.2 1.5 1.6 (1.8)	0.3 0.4 0.5 0.6 0.7 (0.8) (1.0)	40 50 60
							150			40 50 60 70 80 90 100
5						2.5	100	1.5 1.6 (2.0)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5)	40 50 60
							150			40 50 60 70 80 90 100
							200		0.4 0.5 0.6 0.7 0.8 1.0	50 60 70 80 90 100
6						3	100	2.0 (2.5)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5)	40 50 60
							150			40 50 60 70 80 90 100
							200		0.4 0.5 0.6 0.7 0.8 1.0	60 70 80 90 100
7						3.5	100	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5 2.0	40 50 60
								3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5	
							150	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5	40 50 60 70 80 90 100
								3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5	
							200	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
								3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
						4	100	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 2.0	40 50 60
								3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	
							150	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 2.0	40 50 60 70 80 90 100
								3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	
							200	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
								3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
8						4.5	150	4.0	0.6 0.8 1.0 1.2 1.5	40 50 60 70
							200			60 70 80
						5	150	4.0	0.8 1.0 2.0	50 60 80
							200			60 70 80
9						5.5	150	5.0	0.5 0.6 1.0	50 60 80
							200			50 60 70 80
						6	150	5.0	0.8 1.0 1.5	50 60 70 80
							200			60 75 80
—	—	9	6	—	**ERVJB** (JIS Head)	5	150	4.0	0.5 0.8 1.0 1.2	50 60 70
							200			90 100
		10				6	150	5.0	0.8 1.0 1.2	50 60
							200			100
		13	8			8	200	7.5	1.2 1.5	100
							250			150
							300			120 130
		15				10	200	8.0 9.0	1.5 3.0 5.0 5.5	80 100
							250			120
							300			120 150
		17				12	200	10.0	2.0 2.5 3.0 5.0	100
							250			120 150
							300			150

Selections in which both the P and W dimensions are enclosed in brackets ( ) cannot be made.

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

High Speed Steel
SKH51 equivalent

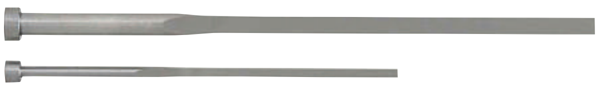
Precision
P・W $^{0}_{-0.005}$
L dimension designation

PRECISION RECTANGULAR EJECTOR PINS

— L DIMENSION DESIGNATION TYPE —

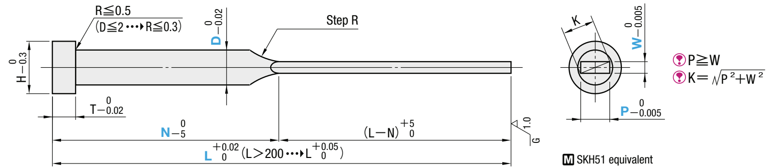
Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number	Head Thickness	T P・W
ERVL ※P—ERVL(Angular tip corner)	4mm(T4)	$^{0}_{-0.005}$
ERVJL	6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
K= $\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)

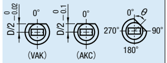
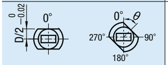
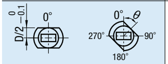
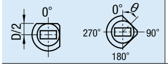
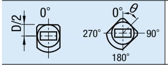
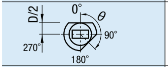
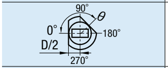
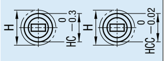
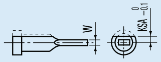
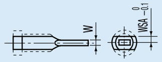
※For P—ERVL, the deburring of tip is not carried out. (For details, refer to the right page.)

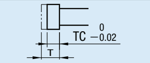
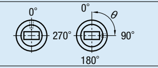
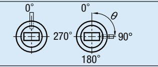
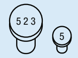
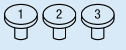
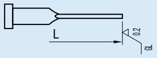
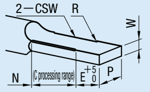
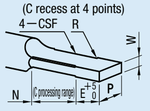
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC…etc.)
ERVL 4	—	105.03	—	P3.0	—	W2.0	—	N50	—	AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK (precision) AKC	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 ⊗ (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only.	
	VAW	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC (precision)	HC, HCC=0.1mm increments (HC) D+1≦HC<H,D≧1.5 (HCC)D+1≦HCC<H—0.3,D≧1.5	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2—0.1 D≧1.5	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2—0.1 D≧1.5	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T Dimensions N becomes shorter by (T—TC). (Dimension L remains unchanged.) T—TC≦Lmax.—L	
	NC	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	Quotation
	TMC	Lapping on the tip face Available when P≧0.6	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1—E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 – CSW, CSF: 0.3 W: W≧1.5 – CSW, CSF: 0.5, 1, 1.5	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5—E30 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L—N)—20	

4mm head H	4mm head T	JIS head H	JIS head T	Part Number 4mm head	Part Number JIS head	D	L 0.01mm increments	P	W	N
2	4	—	—	ERVL (4mm head) P—ERVL (Angular tip corner)	—	1	50.00~100.00	0.3 0.4 0.5 0.6	0.3 0.4 0.5 0.6	40 50 60
3						1.5	50.00~100.00	0.6 0.7 0.8 1.0(1.2)	0.3 0.4 0.5 0.6 (0.8)	40 50 60
							100.01~150.00			50 60 70 75 80 90 100
4						2	50.00~100.00	1.0 1.2 1.5 1.6(1.8)	0.3 0.4 0.5 0.6 0.7 (0.8) (1.0)	40 50 60
							100.01~150.00			40 50 60 70 80 90 100
5						2.5	50.00~100.00	1.5 1.6(2.0)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5)	40 50 60
							100.01~150.00			40 50 60 70 80 90 100
							150.01~200.00		0.4 0.5 0.6 0.7 0.8 1.0	50 60 70 80 90 100
6						3	50.00~100.00	2.0(2.5)	0.4 0.5 0.6 0.7 0.8 1.0 1.2 (1.5)	40 50 60
							100.01~150.00			40 50 60 70 80 90 100
							150.01~200.00		0.4 0.5 0.6 0.7 0.8 1.0	60 70 80 90 100
7						3.5	50.00~100.00	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5 2.0	40 50 60
								3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5	
							100.01~150.00	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5	40 50 60 70 80 90 100
								3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5	
							150.01~200.00	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
								3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
						4	50.00~100.00	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 2.0	40 50 60
								3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	
							100.01~150.00	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 2.0	40 50 60 70 80 90 100
								3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	
							150.01~200.00	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
								3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2	60 70 80 90 100
8						4.5	100.00~150.00	4.0	0.6 0.8 1.0 1.2 1.5	40 50 60 70
							150.01~200.00			60 70 80
						5	100.00~150.00	4.0	0.8 1.0 2.0	50 60 80
							150.01~200.00			60 70 80
9						5.5	100.00~150.00	5.0	0.5 0.6 1.0	50 60 80
							150.01~200.00			50 60 70 80
						6	100.00~150.00	5.0	0.8 1.0 1.5	50 60 70 80
							150.01~200.00			60 75 80
10						6.5	100.00~150.00	6.0	0.8 1.0 1.2	50 60 80
							150.01~200.00			60 80 100
11						8	100.00~150.00	6.0 7.0	0.8 1.0 1.2	50 60 80
							150.01~200.00			60 80 100
15						10	100.00~150.00	8.0	0.8 1.0 1.2 2.0	50 60 80
							150.01~200.00			60 80 100
—	—	9	6	—	ERVJL (JIS Head)	5	100.00~150.00	4.0	0.5 0.8 1.0 1.2	50 60 70
							150.01~200.00			90 100
		10				6	100.00~150.00	5.0	0.8 1.0 1.2	50 60
							150.01~200.00			100
		13	8			8	150.00~200.00	7.5	1.2 1.5	100
							200.01~250.00			150
							250.01~300.00			120 130
		15				10	150.00~200.00	8.0 9.0	1.5 3.0 5.0 5.5	80 100
							200.01~250.00			120
							250.01~300.00			120 150
		17				12	150.00~200.00	10.0	2.0 2.5 3.0 5.0	100
							200.01~250.00			120 150
							250.01~300.00			150

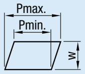
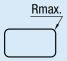
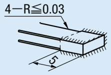
⊗ Selections in which both the P and W dimensions are enclosed in brackets ( ) cannot be made. (L—N)≧10

Order

Part Number	—	L	—	P	—	W	—	N
ERVL 4	—	105.03	—	P3.0	—	W2.0	—	N50

Days to Ship Quotation

Price Quotation

Precision Standard			
Squareness of the tip corner	ERVL P—ERVL ERVJL		W plane as the base (Pmax.—Pmin.)≦0.01
Corner R value of the tip corner	ERVL ERVJL		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)
	P—ERVL		Approximately within 5mm from the tip is without deburring process. 5mm onward, deburring R is within ≦0.03).

High Speed Steel
SKH51 equivalent

Precision
P・W$_{-0.005}^{0}$
Free designation

PRECISION RECTANGULAR EJECTOR PINS

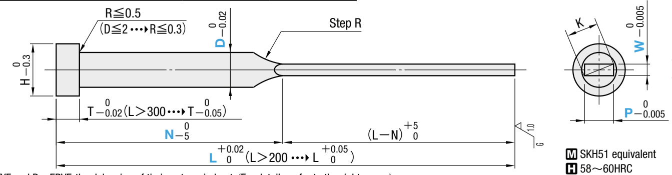
— FREE DESIGNATION TYPE —

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	Head Thickness	T P・W
ERVYF(Small diameter) ※**P—ERVYF**(Small diameter angular tip corner) **ERVF** ※**P—ERVF**(Angular tip corner)	4mm(T4)	$^{0}_{-0.005}$
ERVJ	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
K=$\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)

※For P—ERVYF and P—ERVF, the deburring of tip is not carried out. (For details, refer to the right page.)

Order

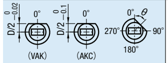
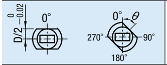
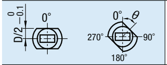
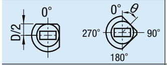
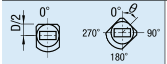
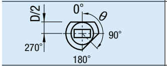
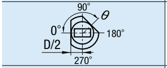
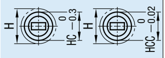
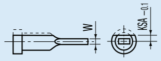
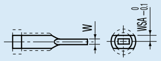
Part Number — L — P — W — N
ERVF 5.5 — 105.03 — P3.50 — W0.65 — N55

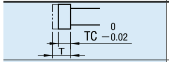
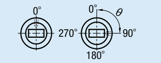
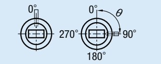
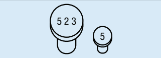
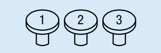
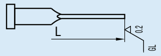
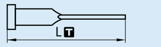
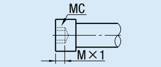
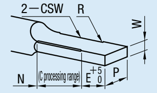
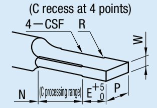
Alterations

Part Number — L — P — W — N — (AKC・AWC···etc.)
ERVF 5.5 — 105.03 — P3.50 — W0.65 — N55 — AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	**VAK** (precision) **AKC**	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 ⊗ (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only. (P—)ERVYF 90° increments	
	**VAW**	VAW=45° increments (P—)ERVYF 90° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	**AWC**	AWC=1° increments (P—)ERVYF 90° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only. ⊗ (P—) ERVYF not available.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only. ⊗ (P—) ERVYF not available.	Quotation
	**KGA**	KGA=1° increments 0<KGA<360 ⊗ (P—) ERVYF not available.	
	**KGD**	KGD=1° increments 0<KGD<360 ⊗ (P—) ERVYF not available.	
	**HC** **HCC** (precision)	HC, HCC=0.1mm increments (HC) D+1≦HC<H,D≧1.5 (HCC)D+1≦HCC<H−0.3,D≧1.5	
	**KSA**	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1 D≧1.5	
	**WSA**	W/2+0.1≦WSA≦D/2−0.1 D≧1.5	

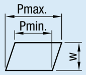
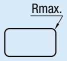
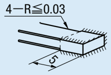
Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments T/2≦TC<T Dimensions L and N remain unchanged. T−TC≦Lmax.−L,D≧1.5	
	**NC**	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NHC**	Numbering on the head How to order P.196	
	**NHN**	Automatic sequential numbering on the head How to order P.196	
	**TMC**	Lapping on the tip face Available when P≧0.6 ⊗ (P—) ERVYF not available.	Quotation
	**LKC**	L dimension tolerance alteration L$^{+0.02}_{0}$ ···▸ $^{+0.01}_{0}$ Available when L≦200	
	**MC**	Tapping D8 ···▸ M4 D10 ···▸ M5 D12・15 ···▸ M6 Only available combination is with CSW・CSF・TMC Available for ERVJ only Available when D≧8	
(C recess processing at 2 points on top) 	**CSW**	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1—E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 — CSW, CSF: 0.3 W: W≧1.5 — CSW, CSF: 0.5, 1, 1.5	
(C recess at 4 points) 	**CSF**	C chamfering processing at 4 points (except tip) for relief is performed. Designation method 8 ptCSF0.5—E30 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20	

4mm head		JIS head		Part Number			0.01mm increments			Kmax.	N	Nmin.
H	T	H	T	4mm head	JIS head	D	L	P	W		1mm increments	
2	4	—	—	**ERVYF** (4mm head) **P—ERVYF** (Angular tip corner)	—	0.8	40.00~100.00	0.30~ 0.60	0.20~	0.7	10≦(L−N)≦50	23
						0.9		0.30~ 0.70		0.8		
						1		0.30~ 0.80		0.9		
3				**ERVF** (4mm head) **P—ERVF** (Angular tip corner)		1.1	40.00~200.00	0.30~ 0.90		1.0	10≦(L−N)≦150	
						1.2		0.30~ 1.00		1.1		
						1.3		0.30~ 1.10		1.2		
						1.4		0.30~ 1.20		1.3		
		3	4		**ERVJ** (JIS Head)	1.5	40.00~250.00	0.50~ 1.30		1.4	10≦(L−N)≦250	
4		4				2	40.00~300.00	0.80~ 1.80		1.9		
5		5				2.5		0.80~ 2.30		2.4		26
6		6				3		0.80~ 2.80	0.30~	2.9		27
7		7				3.5		1.00~ 3.30		3.4		
		8	6			4	40.00~300.00 (40.00~350.00)	1.00~ 3.80		3.9		29
8						4.5		1.20~ 4.30		4.4		
		9				5	50.00~300.00 (50.00~350.00)	1.50~ 4.80	0.40~	4.9		31
9						5.5		1.80~ 5.30	0.50~	5.4		
		10				6		2.00~ 5.80		5.9		33
10		11				6.5		2.00~ 6.30		6.4		40
						7		2.30~ 6.80		6.9		
11		13	8			8		2.30~ 7.80		7.9		
15		15				10		3.00~ 9.80		9.9		
—	—	17		—		12		3.50~11.80	0.80~	11.9		
		20				15		3.50~14.80	1.50~	14.9		

Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ P≧W L dimension in ( ) is for ERVJ.

Days to Ship Quotation

Price Quotation

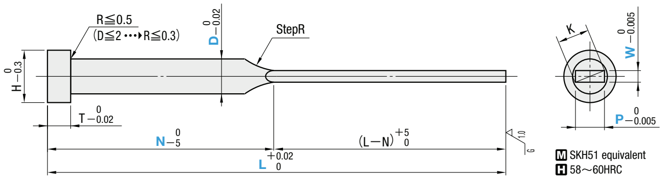
Precision Standard			
Squareness of the tip corner	ERVYF P—ERVYF ERVF P—ERVF ERVJ		W plane as the base (Pmax.—Pmin.)≦0.01
Corner R value of the tip corner	**ERVYF** **ERVF** **ERVJ**		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)
	P—ERVYF P—ERVF		Approximately within 5mm from the tip is without deburring process. 5mm onward, deburring R is within ≦0.03).

PRECISION RECTANGULAR EJECTOR PINS

— N DIMENSION SHORT TYPE —

Part Number	Head Thickness	T P・W
ERVSF	4mm(T4)	$^{0}_{-0.005}$
ERVSJF	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details: see below of the right page)



P≧W
K=$\sqrt{P^2+W^2}$

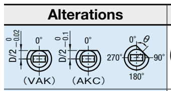
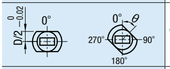
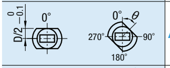
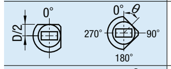
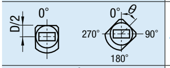
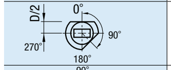
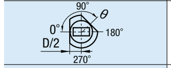
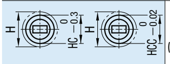
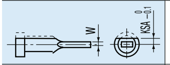
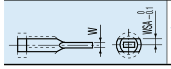
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

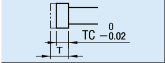
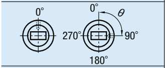
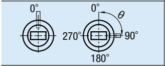
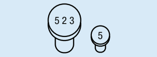
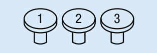
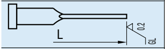
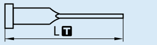
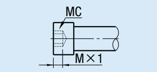
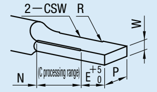
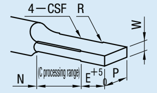
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC⋯etc.)
ERVSF 1.5	—	100.00	—	P1.20	—	W0.30	—	N20	—	AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK (precision) AKC	VAK=45° increments AKC=1° increments 0≦VAK or AKC<360 ⊗ (VAK) KSA,WSA not available (AKC) When combined with KSA/WSA, 90° increments only.	
	VAW	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC (precision)	HC・HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T Dimensions L and N remain unchanged. T−TC≦Lmax.−L	
	NC	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	TMC	Lapping on the tip face	Quotation
	LKC	L dimension tolerance alteration $L^{+0.02}_{0}$ ⋯▸ $^{+0.01}_{0}$ Available when L≦200	
	MC	Tapping D8 ⋯▸ M4 D10 ⋯▸ M5 D12・15 ⋯▸ M6 ⊗ Not available for ERVSF Available when D≧8 Only available combination is with CSW・CSF・TMC	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number 4mm head	Part Number JIS head	D	0.01mm increments L	0.01mm increments P	0.01mm increments W	Kmax.	N 1mm increments	Nmin.
3	4	3	4	ERVSF (4mm head)	ERVSJF (JIS Head)	1.5	40.00～100.00	0.60～1.30	0.30～	1.4	10≦(L−N)≦80	20
4		4				2		0.80～1.80		1.9		
5		5				2.5		1.00～2.30	0.40～	2.4		23
6		6				3		1.00～2.80		2.9		25
7		7				3.5		1.20～3.30	0.50～	3.4		
		8	6			4	40.00～120.00	1.50～3.80		3.9	10≦(L−N)≦90	27
8						4.5		1.50～4.30		4.4		
		9				5	50.00～150.00	1.80～4.80		4.9	10≦(L−N)≦120	29
9						5.5		2.00～5.30		5.4		
		10				6		2.00～5.80	0.60～	5.9		31
10		11				6.5		2.50～6.30		6.4		35
						7		2.50～6.80		6.9		
11		13	8			8		3.00～7.80		7.9		
15		15				10		3.00～9.80	0.80～	9.9		
—	—	17		—		12	50.00～200.00	4.00～11.80	1.00～	11.9	10≦(L−N)≦215	
		20				15	50.00～250.00	5.00～14.80	1.50～	14.9		

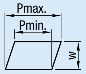
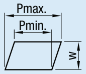
Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ P≧W

Order

Part Number	—	L	—	P	—	W	—	N
ERVSF 1.5	—	100.00	—	P1.20	—	W0.30	—	N20

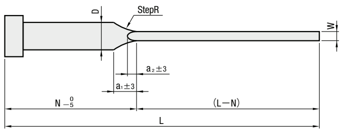
Days to Ship Quotation

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

■ STEP R OF RECTANGULAR EJECTOR PINS -N dimension short type-

For N short type, Step R becomes smaller comparing with that of conventional rectangular ejector pin.



- Step radius (R): R65～75*

(*This is the size of grindstone used to process R section.
This is not a guaranteed value for R.)

- Formula used for calculating the length (a_1) and (a_2) of step R:

$$a_1=5+\sqrt{\frac{D-W}{2}\times\left(2R-\frac{D-W}{2}\right)}$$

$$a_2=5+\sqrt{\frac{D-P}{2}\times\left(2R-\frac{D-P}{2}\right)}$$

*The left formulas include profile error from rough and finish processing.

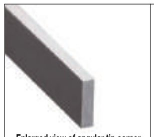
- Concentricity of the rectangular tip section (P・W) and shaft diameter (D): 0.2mm or less

High Speed Steel
SKH51 equivalent

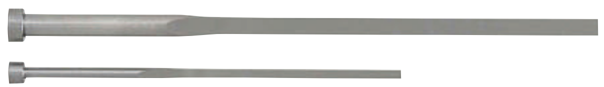
Extra precision
P・W $^{0}_{-0.003}$
Free designation

EXTRA PRECISION RECTANGULAR EJECTOR PINS

— FREE DESIGNATION ／ ANGULAR TIP CORNER・FREE DESIGNATION TYPE —



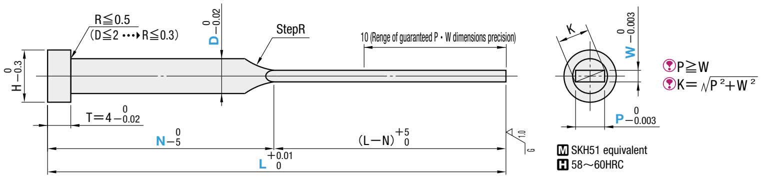
Enlarged view of angular tip corner



RoHS

Part Number	Head Thickness	T P・W
ERZF ※P−ERZF(Angular tip corner)	4mm(T4)	$^{0}_{-0.003}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
K= $\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

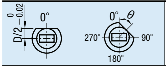
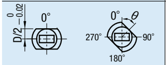
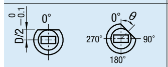
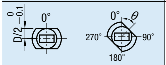
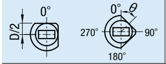
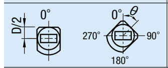
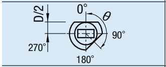
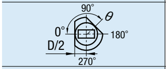
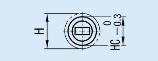
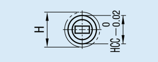
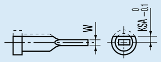
※For P—ERZF, the deburring of tip is not carried out. (For details, refer to the table of precision standard on the right page.)

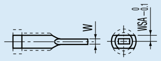
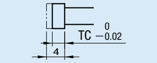
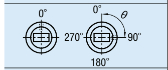
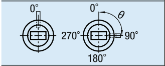
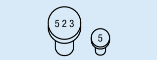
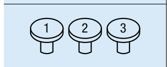
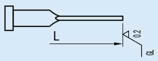
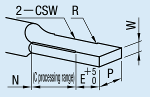
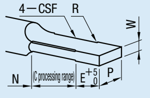
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC…etc.)
ERZF 5.5	—	105.03	—	P3.50	—	W0.65	—	N55	—	AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK	VAK=45° increments 0≦VAK＜360 Combination with KSA/WSA not available.	Quotation
	VAW	VAW=45° increments 0≦VAW＜360 Combination with KSA/WSA not available.	
	AKC	AKC=1° increments 0≦AKC＜360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC＜360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ADC＜360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC＜360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0＜KGA＜360	
	KGD	KGD=1° increments 0＜KGD＜360	
	HC	HC=0.1mm increments D+1≦HC＜H Available when D≧1.5	
	HCC	HCC=0.1mm increments D+1≦HCC＜H−0.3 Available when D≧1.5	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1 Available when D≧1.5	

Alterations	Code	Spec.	1Code
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1 Available when D≧1.5	Quotation
	TC	TC=0.1mm increments 2.0≦TC＜4 Dimension L and N remains unchanged. (ERZF) Dimensions N becomes shorter by (4−TC). (P−ERZF) (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	NC	Dowel hole boring NC=90° increments Available when H≧4 Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	TMC	Lapping on the tip face Available when P≧0.6	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25 CSW, CSF: Range of designation: W 1.0≦W＜1.5 — CSW, CSF 0.3; W≧1.5 — CSW, CSF 0.5, 1, 1.5 P≧1.5 CSW, CSF＜W/2 E=1mm increments 5≦E≦(L−N)−20	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number		0.01mm increments			Kmax.	N 1mm increments	Nmin.
		Type	D	L	P	W			
2	4	ERZF (4mm head) P−ERZF (4mm head angular tip corner)	1	40.00～100.00	0.30～0.80	0.30～	0.9	10≦(L−N)≦200	23
3			1.2		0.30～1.00		1.1		
			1.5		0.60～1.30		1.4		
4			2	40.00～150.00	0.80～1.80		1.9		
5			2.5		0.80～2.30		2.4		26
6			3		0.80～2.80		2.9		27
7			3.5		1.00～3.30		3.4		
			4	40.00～200.00	1.00～3.80		3.9		29
8			4.5		1.20～4.30	0.40～	4.4		
			5		1.50～4.80		4.9		31
9			5.5		1.80～5.30	0.50～	5.4		
			6		2.00～5.80		5.9		33

Designate P・W dimensions within the Kmax. K= $\sqrt{P^2+W^2}$　P≧W

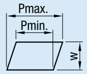
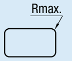
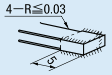
Order

Part Number	—	L	—	P	—	W	—	N
ERZF 2	—	105.03	—	P1.30	—	W0.30	—	N55

Days to Ship Quotation

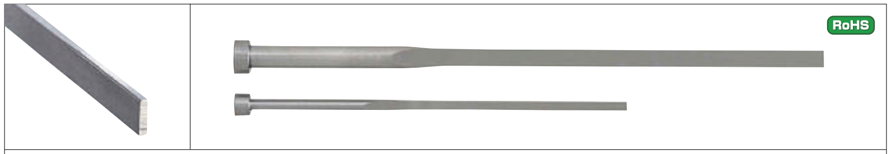
Price Quotation

Precision Standard

Squareness of the tip corner	ERZF P−ERZF		W plane as the base (Pmax.−Pmin.)≦0.005
Corner R value of the tip corner	ERZF		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)
	P−ERZF		Approximately within 5mm from the tip is without deburring process. 5mm onward, deburring R is within ≦0.03).

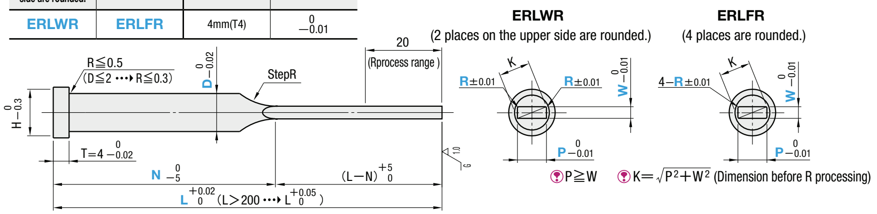
R-CHAMFERED RECTANGULAR EJECTOR PINS

—L DIMENSION DESIGNATION TYPE—



Part Number		Head Thickness	T P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERLWR	**ERLFR**	4mm(T4)	$^{\ 0}_{-0.01}$

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)



P≧W   K=$\sqrt{P^2+W^2}$ (Dimension before R processing)

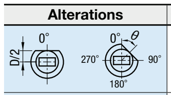
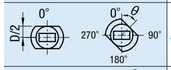
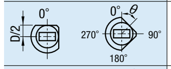
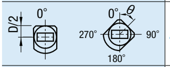
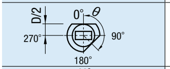
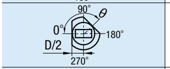
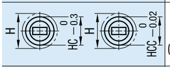
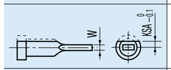
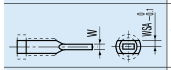
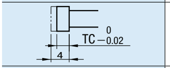
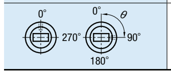
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details **P.1303**)

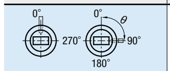
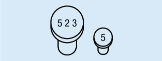
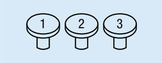
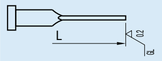
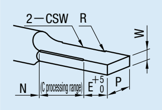
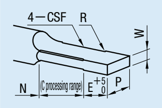
Alterations

Part Number	—	L	—	P	—	W	—	R	—	N	—	(AKC・AWC···etc.)
ERLFR 3	—	200.00	—	P2.0	—	W0.8	—	R0.1	—	N100	—	AKC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	**AWC**	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	**KGA**	KGA=1° increments 0<KGA<360	Quotation
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC** **HCC** (precision)	HC・HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	**KSA**	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	**WSA**	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	**TC**	TC=0.1mm increments 2.0≦TC<4 Dimensions N become shorter by (4−TC) (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	**NC**	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	

Alterations	Code	Spec.	1Code
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NHC**	Numbering on the head How to order **P.196**	
	**NHN**	Automatic sequential numbering on the head How to order **P.196**	
	**TMC**	Lapping on the tip face	Quotation
(C recess processing at 2 points on top) 	**CSW**	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	**CSF**	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

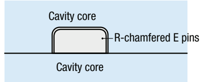
P≧1.5
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

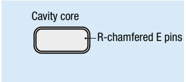
R process range P.196

Example Please select the chamfering R size to suit for the corner R on the cavity core generated by WEDM.

①Separable Piece



②Cavity core in wire hole.



Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number Type	D	L 0.01mm increments	P	W	R	N
3	4	**ERLWR** (2 places on the upper side are rounded.) **ERLFR** (4 places are rounded.)	1.5	60.00～100.00	0.8 1.0 1.2	0.3 0.4 0.5 0.6	0.1	40 50 60
				100.01～150.00				50 60 70 80 90
4			2	60.00～100.00	1.0 1.2 1.5	0.4 0.5 0.6 0.7 0.8 1.0		40 50 60
				100.01～150.00				50 60 70 80 90 100
				150.01～200.00				60 70 80
5			2.5	60.00～100.00	1.5 2.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2		40 50 60
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
6			3	60.00～100.00	2.0 2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2		40 50 60
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 100 120
7			3.5	60.00～100.00	2.5 3.0	0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5		40 50 60
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
				200.01～250.00				80 100
			4	60.00～100.00	3.0 3.5	0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.2 1.5	0.15	40 50 60
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
				200.01～250.00				80 100
8			4.5	60.00～100.00	3.5 4.0	0.6 0.7 0.8 0.9 1.0 1.2 1.5 1.8	0.2	40 50 60 70
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
				200.01～250.00				90 100 120
			5	60.00～100.00	4.0	0.6 0.7 0.8 0.9 1.0 1.2 1.5 1.8 2.0	0.3	40 50 60 70
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
				200.01～250.00				100 120
9			5.5	60.00～100.00	4.5 5.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0		40 50 60 70
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
				200.01～250.00				100 120
			6	60.00～100.00	5.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0	$R \leqq \frac{W}{2} - 0.05$	40 50 60 70
				100.01～150.00				50 60 70 80 90
				150.01～200.00				60 70 80 90 100
				200.01～250.00				70 80 90 100 120
11			8	60.00～100.00	6.0 7.0	0.8 0.9 1.0 1.2 1.5 1.8 2.0 2.5		40 50 60
				100.01～150.00				50 60 70 80 90 100
				150.01～200.00				70 80 90 100 120
				200.01～250.00				80 90 100 120 150
15			10	60.00～100.00	8.0	1.0 1.2 1.5 1.8 2.0 2.5		40 50 60
				100.01～150.00				50 60 70 80 90 100
				150.01～200.00				60 70 80 90 100 120
				200.01～250.00				90 100 120 150
17			12	60.00～100.00	10.0	1.2 1.5 1.8 2.0		40 60
				100.01～150.00				60 70 80 90 100
				150.01～200.00				70 80 90 100 120
				200.01～250.00				80 90 100 120 150

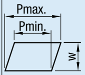
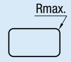
Select R dimension from the range of $R \leqq \frac{W}{2} - 0.05$.   L−N≧20

Order

Part Number	—	L	—	P	—	W	—	R	—	N
ERLFR3	—	200.00	—	P2.0	—	W0.8	—	R0.1	—	N100

Days to Ship Quotation

Price Quotation

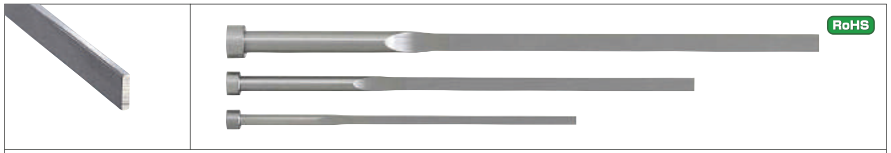
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details **P.1313**)

High Speed Steel
SKH51 equivalent

R-chamfered | P・W $^{0}_{-0.01}$ Free designation

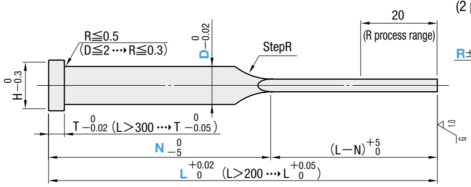
R-CHAMFERED RECTANGULAR EJECTOR PINS

—FREE DESIGNATION TYPE—



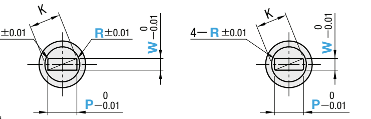
Part Number		Head Thickness	T P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERWR	**ERFR**	4mm(T4)	$^{0}_{-0.01}$
ERJWR	**ERJFR**	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



ERWR
ERJWR
(2 places on top are rounded.)

ERFR
ERJFR
(4 places are rounded.)

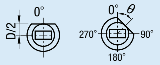
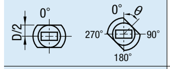
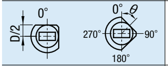
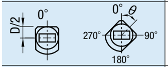
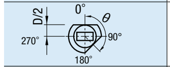
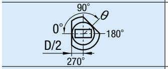
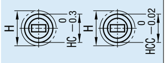
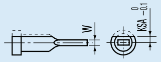
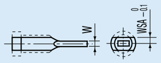
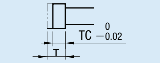


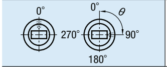
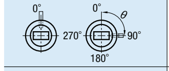
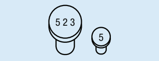
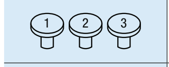
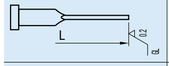
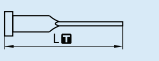
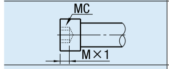
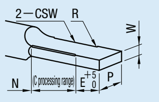
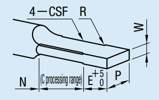
P≧W　K=$\sqrt{P^2+W^2}$ (Dimension before R processing)
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Alterations

Part Number	L	P	W	R	N	(AKC・AWC···etc.)
ERFR 4	200.00	P2.00	W0.80	R0.1	N150	AKC 0

Alteration details P.195

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	**AWC**	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	**KGA**	KGA=1° increments 0<KGA<360	Quotation
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC** **HCC** (precision)	HC・HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	**KSA**	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	**WSA**	WSA=0.1mm increments /2+0.1≦WSA≦D/2−0.1	
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	**NC**	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	**NHC**	Numbering on the head How to order P.196	
	**NHN**	Automatic sequential numbering on the head How to order P.196	
	**TMC**	Lapping on the tip face	Quotation
	**LKC**	L dimension tolerance alteration $L^{+0.02}_{0}$ ···› $^{+0.01}_{0}$ Available when L≦200	
	**MC**	Tapping D8・8.5 ···› M4 D10・10.5 ···› M5 D12・15 ···› M6 ⊗ Not available for ERWR・ERFR. Available when D≧8 ⊗ Only available combination is with CSW・CSF・TMC	
(C recess processing at 2 points on top) 	**CSW**	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25 CSW, CSF: Range of designation W 1.0≦W<1.5: CSW, CSF 0.3 W≧1.5: CSW, CSF 0.5 / 1 / 1.5 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20 R process range P.196	
(C recess at 4 points) 	**CSF**	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			R	Kmax.	N 1mm increments	Nmin.
H	T	H	T	4mm head	JIS head	D	L	P	W				
3	4	3	4	**ERWR** (2 places on the upper side are rounded.) **ERFR** (4 places are rounded.)	**ERJWR** (2 places on the upper side are rounded.) **ERJFR** (4 places are rounded.)	1.5	50.00～250.00	0.60～ 1.30	0.30～	0.1 0.15 0.2 0.3 R≦$\frac{W}{2}$−0.05	1.4	20≦(L−N) (L−N)≦250	23
4		4				2	50.00～300.00	0.80～ 1.80			1.9		
5		5				2.5		0.80～ 2.30			2.4		26
6		6				3	50.00～350.00	0.80～ 2.80			2.9		27
7		7				3.5		1.00～ 3.30			3.4		
		8	6			4		1.00～ 3.80			3.9		29
8						4.5		1.20～ 4.30			4.4		
		9				5	50.00～350.00	1.50～ 4.80	0.40～		4.9		31
9						5.5		1.80～ 5.30	0.50～		5.4		
		10				6		2.00～ 5.80			5.9		33
10		11				6.5		2.00～ 6.30			6.4		40
						7		2.30～ 6.80			6.9		
11		13	8			8		2.30～ 7.80			7.9		
14		14				8.5		2.30～ 8.30			8.4		
15		15				10		3.00～ 9.80			9.9		
17		17				10.5		3.00～10.30			10.4		
						12		3.50～11.80	0.80～		11.9		
—	—	20		—		15		3.50～14.80	1.50～		14.9		

Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$(Dimention before R processing)　P≧W　Select R dimension from the range of R≦$\frac{W}{2}$−0.05.

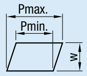
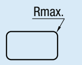
Order

Part Number	L	P	W	R	N
ERFR 4	200.00	P2.00	W0.80	R0.1	N150

Days to Ship Quotation

Price Quotation

Precision Standard

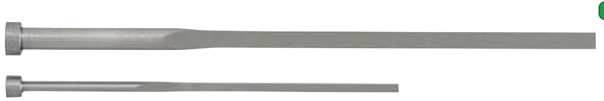
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

High Speed Steel
SKH51 equivalent

R-chamfered $P・W^{0}_{-0.01}$ Free designation

R-CHAMFERED RECTANGULAR EJECTOR PINS

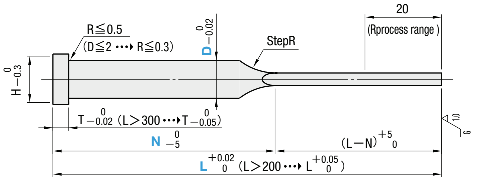
—FREE DESIGNATION・R POSITION SELECTION TYPE—

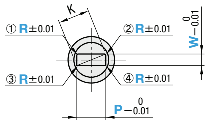


RoHS

Part Number				Head Thickness	T P・W
1 place is rounded.	2 places are rounded.	3 places are rounded.	4 places are rounded.		
ER1AR ER1BR	ERWR ER2BR ER2CR ER2DR	ER3AR ER3BR	ERFR	4mm(T4)	$^{0}_{-0.01}$
ERJ1AR ERJ1BR	ERJWR ERJ2BR ERJ2CR ERJ2DR	ERJ3AR ERJ3BR	ERJFR	4・6・8mm(JIS)	

No. of R	Shape	R parts			
		① Upper left	② Upper right	③ Lower left	④ Lower right
1	1AR	①	—	—	—
	1BR	—	②	—	—
2	WR	①	②	—	—
	2BR	①	—	③	—
	2CR	①	—	—	④
	2DR	—	②	③	—
3	3AR	①	②	③	—
	3BR	①	②	—	④
4	FR	①	②	③	④





R position is selected from R−position Designation **Shape**

P≧W　K=$\sqrt{P^2+W^2}$ (Dimension before R processing)

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)

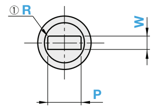
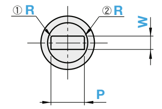
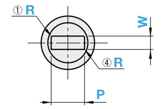
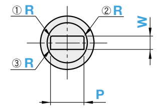
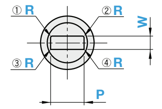
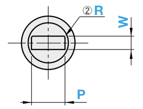
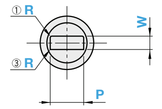
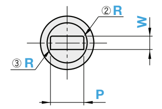
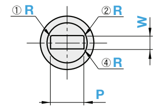
Step R (Details **P.1302**)

M SKH51 equivalent

H 58～60HRC

Range of guaranteed base material hardness (Details **P.1303**)

■R-position Designation

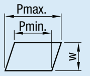
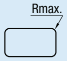
Shape				
One place of R	Two places of R: Horizontal/Longitudinal	Two places of R: Diagonal	Three places of R	Four places of R
1AR ① Upper left 	**WR** ① Upper left ② Upper right 	**2CR** ① Upper left ④ Lower right 	**3AR** ① Upper left ② Upper right ③ Lower left 	**FR** 4 places 
1BR ② Upper right 	**2BR** ① Upper left ③ Lower left 	**2DR** ② Upper right ③ Lower left 	**3BR** ① Upper left ② Upper right ④ Lower right 	R tolerance±0.01

Order

Part Number — L — P — W — R — N
ER1AR 4 — 200.00 — P2.00 — W1.00 — R0.1 — N150

Days to Ship Quotation

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details **P.1313**)

Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type	Part Number Shape	D	L (0.01mm increments)	P (0.01mm increments)	W (0.01mm increments)	R	Kmax.	N 1mm increments	Nmin.
3	4	3	4	ER (4mm head D1.5～12) ERJ (JIS head D1.5～15)	1AR 1BR WR 2BR 2CR 2DR 3AR 3BR FR	1.5	50.00～250.00	0.60～ 1.30	0.30～	0.1 0.15 0.2 0.3 R≦$\frac{W}{2}$−0.05	1.4	20≦(L−N)≦250	23
4		4				2	50.00～300.00	0.80～ 1.80			1.9		
5		5				2.5		0.80～ 2.30			2.4		26
6		6				3	50.00～350.00	0.80～ 2.80			2.9		27
7		7				3.5		1.00～ 3.30			3.4		
		8	6			4		1.00～ 3.80			3.9		29
8						4.5		1.20～ 4.30	0.40～		4.4		
		9				5		1.50～ 4.80			4.9		31
9						5.5		1.80～ 5.30	0.50～		5.4		
		10				6		2.00～ 5.80			5.9		33
10		11				6.5		2.00～ 6.30			6.4		40
						7		2.30～ 6.80			6.9		
11		13	8			8		2.30～ 7.80			7.9		
14		14				8.5		2.30～ 8.30			8.4		
15		15				10		3.00～ 9.80			9.9		
17		17				10.5		3.00～10.30			10.4		
						12		3.50～11.80	0.80～		11.9		
—	—	20				15		3.50～14.80	1.50～		14.9		

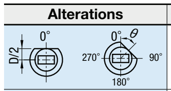
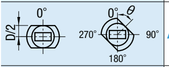
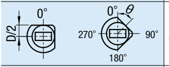
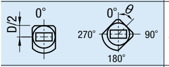
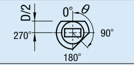
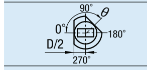
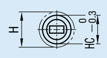
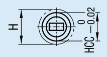
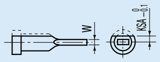
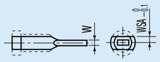
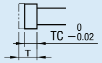
Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$(Dimention before R processing)　P≧W

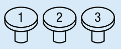
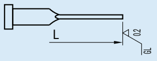
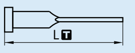
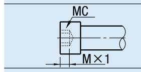
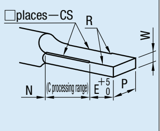
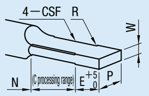
Select R dimension from the range of R≦$\frac{W}{2}$−0.05.

Alterations

Part Number — L — P — W — R — N — (AKC・AWC⋯etc.)
ER1AR 4 — 200.00 — P2.00 — W1.00 — R0.1 — N150 — AKC 0—CS1—E30

Alteration details P.195

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	**AWC**	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	**KGA**	KGA=1° increments 0<KGA<360	Quotation
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC**	HC=0.1mm increments D+1≦HC<H	
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3	
	**KSA**	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	**WSA**	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	

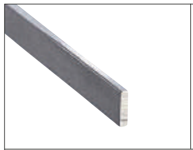
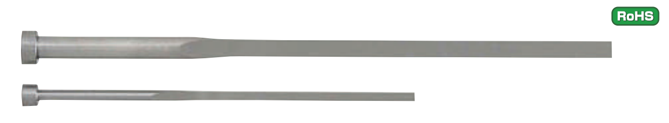
Alterations	Code	Spec.	1Code
	NHC	Numbering on the head How to order **P.196**	
	**NHN**	Automatic sequential numbering on the head How to order **P.196**	
	**TMC**	Lapping on the tip face	
	**LKC**	L dimension tolerance alteration $L^{+0.02}_{0}$ ⋯▸ $^{+0.01}_{0}$ Available when L≦200	
	**MC**	Tapping D8・8.5 ⋯▸ M4 D10・10.5 ⋯▸ M5 D12・15 ⋯▸ M6 Available when D≧8 Only available combination is with CS・CSF・TMC	Quotation
(C recess processing at desinated points) 	**CS**	Process C recess at the bottom of R processed (except tip) Process C recess at all places R processed. Designation method CS1−E25	
(C recess at 4 points) 	**CSF**	C recess processing at 4 points (except tip) Designation method CSF0.5−E30	

Range of designation	
W	CS, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CS, CSF<W/2
E=1mm increments
5≦E≦(L−N)−20
R process range P.196

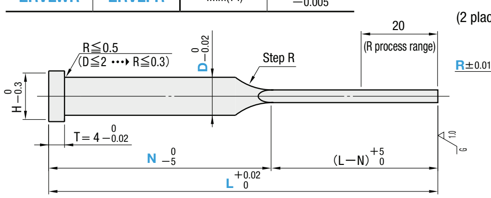
R-CHAMFERED PRECISION RECTANGULAR EJECTOR PINS

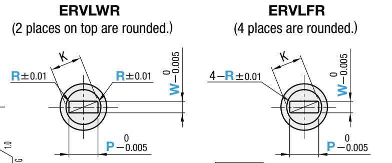
—L DIMENSION DESIGNATION TYPE—



RoHS

Part Number		Head Thickness	T P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERVLWR	**ERVLFR**	4mm(T4)	$^{0}_{-0.005}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)





P≧W　K=$\sqrt{P^2+W^2}$ (Dimension before R processing)

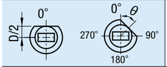
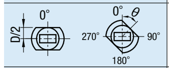
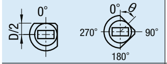
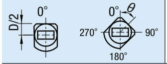
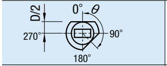
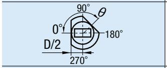
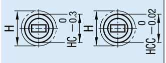
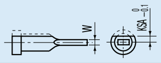
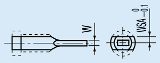
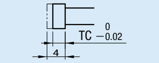
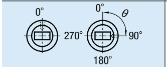
M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)

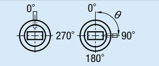
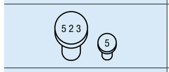
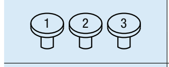
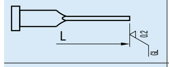
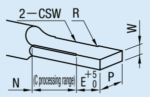
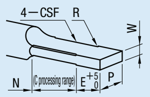
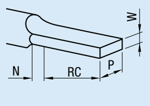
Alterations

Part Number	—	L	—	P	—	W	—	R	—	N	—	(AKC・AWC···etc.)
ERVLFR 3	—	200.00	—	P2.0	—	W0.8	—	R0.1	—	N100	—	AKC0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC (precision)	HC・HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments /2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments 2.0≦TC<4 Dimensions N become shorter by (4−TC) (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	NC	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	

Alterations	Code	Spec.	1Code
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	Quotation
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	TMC	Lapping on the tip face	
(C recess processing at 2 points on top) 	CSW	C-chamfering processing at 2 corners of the blade (except tip) for relief. Designation method CSW1−E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 — CSW, CSF: 0.3 W: W≧1.5 — CSW, CSF: 0.5, 1, 1.5 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20 R process range P.196 RC processing is prioritized when combining with RC.	
(C recess at 4 points) 	CSF	C-chamfering processing at 4 corners of the blade (except tip) for relief. Designation method CSF0.5−E30	
	RC	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed.	

Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number Type	D	L 0.01mm increments	P	W	R	N
3	4	**ERVLWR** (2 places on the upper side are rounded.) **ERVLFR** (4 places are rounded.)	1.5	60.00~100.00	0.6 0.7 0.8 1.0 1.2	0.3 0.4 0.5 0.6	0.05 0.1 0.15 0.2 0.3 R≦$\frac{W}{2}$−0.05	40 50 60
				100.01~150.00				50 60 70 75 80 90
4			2	60.00~100.00	1.0 1.2 1.5 1.6 1.8	0.3 0.4 0.5 0.6 0.7 0.8 1.0		40 50 60
				100.01~150.00				50 60 70 80 90 100
5			2.5	60.00~100.00	1.5 1.6 2.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2		40 50 60
				100.01~150.00				50 60 70 80 90 100
				150.01~200.00		0.4 0.5 0.6 0.7 0.8 1.0		50 60 70 80 90 100
6			3	60.00~100.00	2.0 2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2		40 50 60
				100.01~150.00				50 60 70 80 90 100
				150.01~200.00		0.4 0.5 0.6 0.7 0.8 1.0		60 70 80 90 100
7			3.5	60.00~100.00	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5 2.0		40 50 60
					3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5		
				100.01~150.00	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2 1.5		50 60 70 80 90 100
					3.0			
				150.01~200.00	2.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2		60 70 80 90 100
					3.0			
			4	60.00~100.00	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 2.0		40 50 60
					3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2		
				100.01~150.00	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2 2.0		50 60 70 80 90 100
					3.5	0.4 0.5 0.6 0.7 0.8 1.0 1.2		
				150.01~200.00	3.0	0.4 0.5 0.6 0.7 0.8 1.0 1.2		60 70 80 90 100
					3.5			
8			4.5	100.00~150.00	4.0	0.6 0.8 1.0 1.2 1.5		40 50 60 70 80 90
				150.01~200.00				60 70 80 90 100
			5	100.00~150.00	4.0	0.8 1.0 2.0		50 60 70 80 90
				150.01~200.00				60 70 80 90 100
9			5.5	100.00~150.00	5.0	0.5 0.6 1.0		50 60 70 80 90
				150.01~200.00				70 80 90 100
			6	100.00~150.00	5.0	0.8 1.0 1.5		50 60 70 80 90
				150.01~200.00				75 80 90 100

Select R dimension from the range of R≦$\frac{W}{2}$−0.05.　L−N≧20

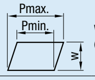
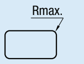
Order

Part Number	—	L	—	P	—	W	—	R	—	N
ERVLFR 3	—	200.00	—	P2.0	—	W0.8	—	R0.1	—	N100

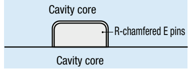
Days to Ship Quotation

Price Quotation

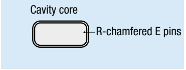
Example Please select the chamfering R size to suit for the corner R on the cavity core generated by WEDM.

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

①Separable Piece



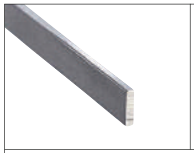
②Cavity core in wire hole.

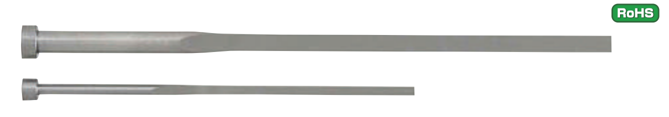


High Speed Steel
SKH51 equivalent

R-chamfered
Precision
$P \cdot W_{-0.005}^{0}$
Free designation

R-CHAMFERED PRECISION RECTANGULAR EJECTOR PINS
—FREE DESIGNATION TYPE—

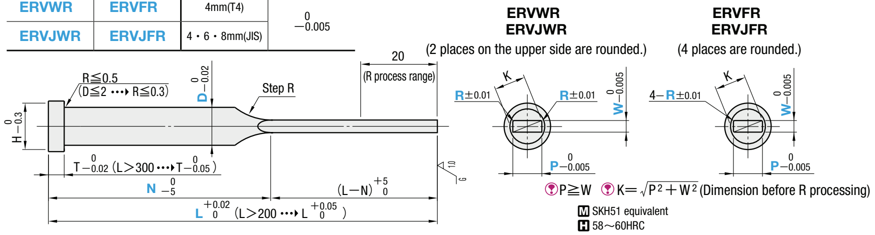




RoHS

Part Number		Head Thickness	T P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERVWR	**ERVFR**	4mm(T4)	$_{-0.005}^{0}$
ERVJWR	**ERVJFR**	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



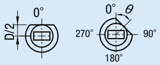
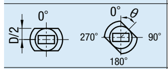
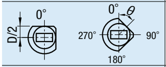
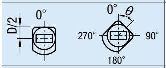
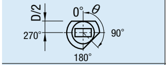
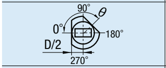
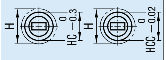
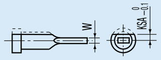
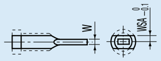
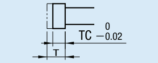
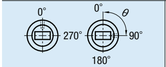
P≧W $K=\sqrt{P^2+W^2}$ (Dimension before R processing)

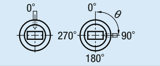
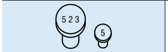
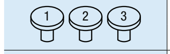
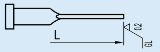
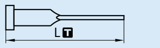
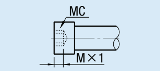
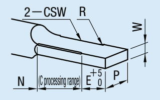
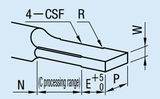
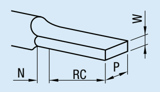
M SKH51 equivalent
H 58∼60HRC
Range of guaranteed base material hardness (Details P.1303)

Alterations

Part Number — L — P — W — R — N — (AKC・AWC···etc.)
ERVFR 4 — 200.00 — P2.00 — W0.80 — R0.1 — N150 — AKC 0

Alteration details P.195

Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	**AWC**	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC** **HCC** (precision)	HC・HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	
	**KSA**	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	**WSA**	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	**NC**	Dowel hole boring NC=90° increments Available when H≧4 Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	

Alterations	Code	Spec.	1Code
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	Quotation
	**NHC**	Numbering on the head How to order P.196	
	**NHN**	Automatic sequential numbering on the head How to order P.196	
	**TMC**	Lapping on the tip face	
	**LKC**	L dimension tolerance alteration $L_{0}^{+0.02}$···▸$_{0}^{+0.01}$ Available when L≦200	
	**MC**	Tapping D8 ···▸ M4 D10 ···▸ M5 D12・15 ···▸ M6 Not available for ERVWR・ERVFR Available when D≧8 Only available combination is with CSW・CSF・TMC	
(C recess processing at 2 points on top) 	**CSW**	C-chamfering processing at 2 corners of the blade (except tip) for relief. Designation method CSW1−E25 CSW, CSF: Range of designation W 1.0≦W<1.5: CSW, CSF 0.3 W≧1.5: CSW, CSF 0.5, 1, 1.5 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20 R process range P.196 RC processing is prioritized when combining with RC.	
(C recess at 4 points) 	**CSF**	C-chamfering processing at 4 corners of the blade (except tip) for relief. Designation method CSF0.5−E30	
	**RC**	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed	

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			R	Kmax.	N 1mm increments	Nmin.
H	T	H	T	4mm head	JIS head	D	L	P	W				
3	4	3	4	**ERVWR** (2 places on the upper side are rounded.) **ERVFR** (4 places are rounded.)	**ERVJWR** (2 places on the upper side are rounded.) **ERVJFR** (4 places are rounded.)	1.5	50.00∼250.00	0.60∼ 1.30	0.30∼	0.05 0.1 0.15 0.2 0.3 $R \leqq \frac{W}{2}-0.05$	1.4	20≦(L−N)≦250	23
4		4				2	50.00∼300.00	0.80∼ 1.80			1.9		
5		5				2.5		0.80∼ 2.30			2.4		26
6		6				3		0.80∼ 2.80			2.9		27
7		7				3.5		1.00∼ 3.30			3.4		
		8	6			4	50.00∼300.00 (50.00∼350.00)	1.00∼ 3.80			3.9		29
8						4.5		1.20∼ 4.30			4.4		
		9				5	50.00∼300.00 (50.00∼350.00)	1.50∼ 4.80	0.40∼		4.9		31
9						5.5		1.80∼ 5.30	0.50∼		5.4		
		10				6		2.00∼ 5.80			5.9		33
10		11				6.5		2.00∼ 6.30			6.4		40
						7		2.30∼ 6.80			6.9		
11		13	8			8		2.30∼ 7.80			7.9		
15		15				10		3.00∼ 9.80			9.9		
—	—	17		—		12		3.50∼11.80	0.80∼		11.9		
		20				15		3.50∼14.80	1.50∼		14.9		

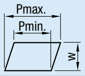
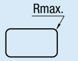
Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$(Dimention before R processing) P≧W
Select R dimension from the range of $R \leqq \frac{W}{2}-0.05$. L dimension in ( ) is only for ERVJWR・ERVJFR.

Order

Part Number — L — P — W — R — N
ERVFR 4 — 200.00 — P2.00 — W0.80 — R0.1 — N150

Days to Ship Quotation

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

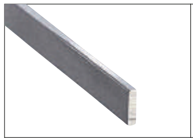
High Speed Steel
SKH51 equivalent

R-chamfered | Precision
$P \cdot W^{0}_{-0.005}$
Free designation

R-CHAMFERED PRECISION RECTANGULAR EJECTOR PINS

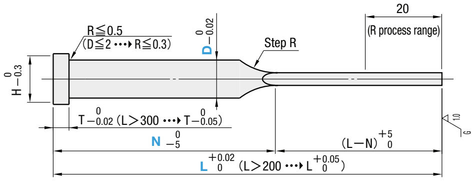
—FREE DESIGNATION · R POSITION SELECTION TYPE—

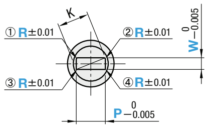
RoHS



Part Number				Head thickness	T P · W
1 place is rounded.	2 places are rounded.	3 places are rounded.	4 places are rounded.		
ERV1AR ERV1BR	ERVWR ERV2BR ERV2CR ERV2DR	ERV3AR ERV3BR	ERVFR	4mm(T4)	$^{0}_{-0.005}$
ERVJ1AR ERVJ1BR	ERVJWR ERVJ2BR ERVJ2CR ERVJ2DR	ERVJ3AR ERVJ3BR	ERVJFR	4・6・8mm(JIS)	

No. of R	Shape	R parts			
		①Upper left	②Upper right	③Lower left	④Lower right
1	1AR	①	—	—	—
	1BR	—	②	—	—
2	WR	①	②	—	—
	2BR	①	—	③	—
	2CR	①	—	—	④
	2DR	—	②	③	—
3	3AR	①	②	③	—
	3BR	①	②	—	④
4	FR	①	②	③	④





R position is selected from R−position Designation **Shape**.

P≧W　$K=\sqrt{P^2+W^2}$ (Dimension before R processing)

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)

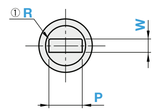
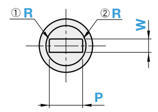
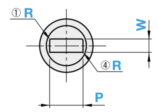
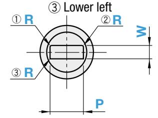
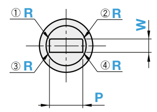
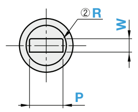
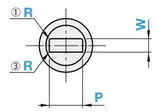
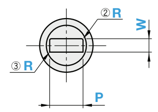
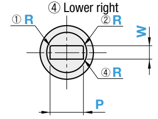
Step R (Details **P.1302**)

M SKH51 equivalent

H 58～60HRC

Range of guaranteed base material hardness (Details **P.1303**)

■R-position Designation

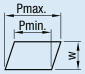
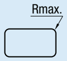
Shape				
One place of R	Two places of R		Three places of R	Four places of R
	Horizontal/Longitudinal	Diagonal		
1AR ① Upper left 	**WR** ① Upper left ② Upper right 	**2CR** ① Upper left ④ Lower right 	**3AR** ① Upper left ② Upper right ③ Lower left 	**FR** 4 places 
1BR ② Upper right 	**2BR** ① Upper left ③ Lower left 	**2DR** ② Upper right ③ Lower left 	**3BR** ① Upper left ② Upper right ④ Lower right 	R tolerance±0.01

Order

Part Number	—	L	—	P	—	W	—	R	—	N
ERV1AR 4	—	200.00	—	P2.00	—	W1.00	—	R0.1	—	N150

Days to Ship Quotation

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.—Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details **P.1313**)

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			R	Kmax.	N 1mm increments	Nmin.
H	T	H	T	Type	Shape	D	L	P	W				
3	4	3	4	ERV (4mm head D1.5～10) ERVJ (JIS head D1.5～15)	1AR 1BR WR 2BR 2CR 2DR 3AR 3BR FR	1.5	50.00～250.00	0.60～ 1.30	0.30～	0.05 0.1 0.15 0.2 0.3 $R\leqq\frac{W}{2}-0.05$	1.4	20≦(L−N)≦250	23
4		4				2	50.00～300.00	0.80～ 1.80			1.9		
5		5				2.5		0.80～ 2.30			2.4		26
6		6				3		0.80～ 2.80			2.9		27
7		7				3.5		1.00～ 3.30			3.4		
		8	6			4	50.00～300.00 (50.00～350.00)	1.00～ 3.80			3.9		29
8						4.5		1.20～ 4.30	0.40～		4.4		
		9				5	50.00～300.00 (50.00～350.00)	1.50～ 4.80			4.9		31
9						5.5		1.80～ 5.30	0.50～		5.4		
		10				6		2.00～ 5.80			5.9		33
10		11				6.5		2.00～ 6.30			6.4		40
						7		2.30～ 6.80			6.9		
11		13	8			8		2.30～ 7.80			7.9		
15		15				10		3.00～ 9.80			9.9		
—	—	17		—		12		3.50～11.80	0.80～		11.9		
		20				15		3.50～14.80	1.50～		14.9		

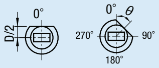
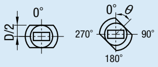
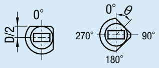
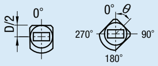
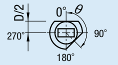
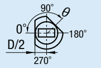
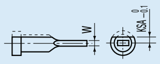
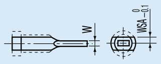
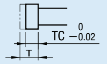
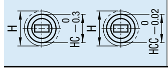
Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ (Dimention before R processing)　P≧W

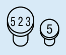
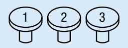
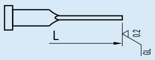
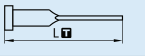
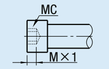
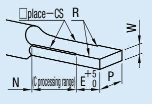
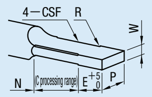
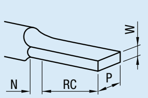
Select R dimension from the range of $R\leqq\frac{W}{2}-0.05$.　L dimension in (　) will be available for ERVJ□□R.

Alterations

Part Number	—	L	—	P	—	W	—	R	—	N	—	(AKC・AWC···etc.)
ERV1AR 4	—	200.00	—	P2.00	—	W1.00	—	R0.1	—	N150	—	AKC 0–CS1–E30–RC25

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	HC HCC (precision)	HC・HCC=0.1mm increments (HC) D+1≦HC<H (HCC)D+1≦HCC<H−0.3	

Alterations	Code	Spec.	1Code
	NHC	Numbering on the head How to order **P.196**	Quotation
	NHN	Automatic sequential numbering on the head How to order **P.196**	
	TMC	Lapping on the tip face	
	LKC	L dimension tolerance alteration $L^{+0.02}_{0}$ ···› $^{+0.01}_{0}$ Available when L≦200	
	MC	Tapping D8 ···› M4 D10 ···› M5 D12・15 ···› M6 Available when D≧8 Only available combination is with CS・CSF・TMC	
(Crecess processing at desinated points) 	CS	Process C recess at the bottom of R processed (except tip). Process C recess at all places R processed. Designation method CS1−E25	
(C recess at 4 points) 	CSF	C-chamfering processing at 4 corners of the blade (except tip) for relief. Designation method CSF0.5−E30	
	RC	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed RC processing is prioritized when combining with CSW・CSF.	

Range of designation (CS, CSF)

W	CS, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5

CS, CSF<W/2

E=1mm increments

5≦E≦(L−N)−20

R process range **P.196**

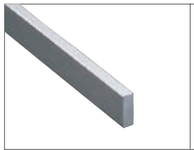
RC processing is prioritized when combining with RC.

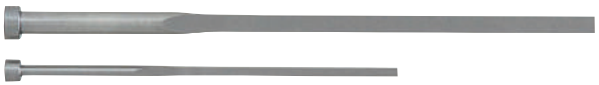
High Speed Steel
SKH51 equivalent

C-chamfered
P・W $_{-0.01}^{\;0}$
Free designation

C-CHAMFERED RECTANGULAR EJECTOR PINS

—FREE DESIGNATION TYPE—

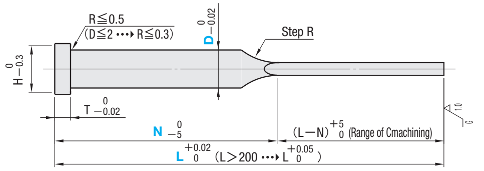


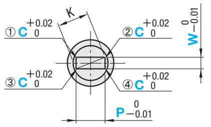


RoHS

Part Number			Head Thickness	T P・W
1 place is chamfered.	2 places are chamfered.	4 places are chamfered.		
ERF1AC ERF1BC	ERF2AC ERF2BC ERF2CC ERF2DC	ERF4AC	4mm(T4)	$_{-0.01}^{\;0}$
ERJF1AC ERJF1BC	ERJF2AC ERJF2BC ERJF2CC ERJF2DC	ERJF4AC	4・6・8mm(JIS)	$_{-0.01}^{\;0}$

No. of C	Shape	C parts			
		①Upper left	②Upper right	③Lower left	④Lower right
1	1AC	①	—	—	—
	1BC	—	②	—	—
2	2AC	①	②	—	—
	2BC	①	—	③	—
	2CC	①	—	—	④
	2DC	—	②	③	—
4	4AC	①	②	③	④


R≦0.5
(D≦2 ･･･▸ R≦0.3)
$D_{-0.02}^{\;0}$
Step R
$H_{-0.3}^{\;0}$
$T_{-0.02}^{\;0}$
$N_{-5}^{\;0}$
$(L-N)_{\;0}^{+5}$ (Range of Cmachining)
$L_{\;0}^{+0.02}$ $(L>200 \cdots\!\blacktriangleright L_{\;0}^{+0.05})$
1.0
G

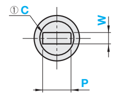
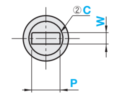
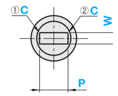
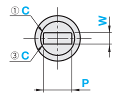
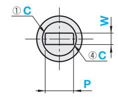
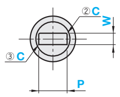
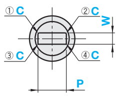


Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

C position is selected from C–position selection Shape .
P≧W $K=\sqrt{P^2+W^2}$ (Dimension before C processing)

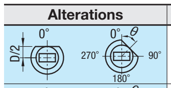
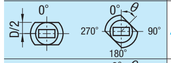
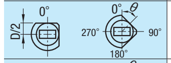
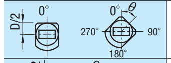
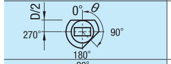
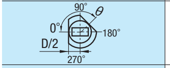
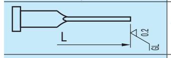
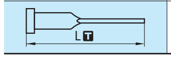
■C-position Designation

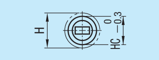
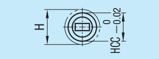
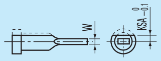
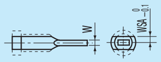
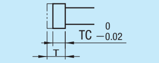
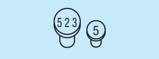
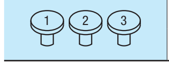
Shape						
One place of C		Two places of C				Four places of C
1AC	1BC	2AC	2BC	2CC	2DC	4AC
① Upper left	② Upper right	① Upper left ② Upper right	① Upper left ③ Lower left	① Upper left ④ Lower right	② Upper right ③ Lower left	4 places
						

Alterations

Part Number	—	L	—	P	—	W	—	C	—	N	—	(AKC・AWC···etc.)
ERF2AC4	—	150.00	—	P3.0	—	W1.0	—	C0.1	—	N60	—	AKC90

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	TMC	Lapping on the tip face	
	LKC	L dimension tolerance alteration $L_{\;0}^{+0.02} \cdots\!\blacktriangleright {}_{\;0}^{+0.01}$ Available when L≦200	

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			C	Kmax.	N 1mm increments	Nmin.
H	T	H	T	Type	Shape	D	L	P	W				
3	4	3	4	ERF (4mm head) ERJF (JIS head)	1AC 1BC 2AC 2BC 2CC 2DC 4AC	1.5	50.00～250.00	0.60～ 1.30	0.30～	0.06 0.1 0.15 0.2 0.3 $C\leqq\frac{W}{2}-0.07$	1.4	20≦(L−N)≦200	23
4		4				2		0.80～ 1.80			1.9		
5		5				2.5		0.80～ 2.30			2.4		26
6		6				3		0.80～ 2.80			2.9		27
7		7				3.5		1.00～ 3.30			3.4		
		8	6			4		1.00～ 3.80			3.9		29
8						4.5		1.20～ 4.30	0.40～		4.4		
		9				5		1.50～ 4.80			4.9		31
9						5.5		1.80～ 5.30	0.50～		5.4		
		10				6		2.00～ 5.80			5.9		33
10		11				7		2.30～ 6.80			6.9		40
11		13	8			8		2.30～ 7.80			7.9		
15		15				10		3.00～ 9.80			9.9		
17		17				12		3.50～11.80	0.80～		11.9		

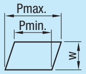
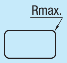
Designate P・W dimensions within the Kmax. Select a dimension from the range of $C\leqq\frac{W}{2}-0.07$.

Order

Part Number	—	L	—	P	—	W	—	C	—	N
ERF2AC4	—	150.00	—	P3.0	—	W1.0	—	C0.1	—	N60

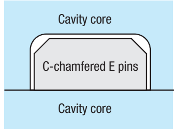
Days to Ship Quotation

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

Example

Separable Piece



- As a result of C-chamfering machining, a clearance between the E pin and the cavity core becomes larger, enabling this construction to be used as a gas vent as well.
- C-chamfering machining is performed as far as the step R(L−N), enabling the extra machining of gas vent to be omitted.

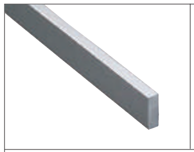
When using a highly fluid resin, resin burrs sometimes occur, so it is recommended using the conventional rectangular ejector pins in such a case.

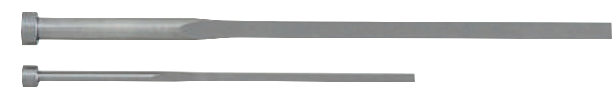
High Speed Steel
SKH51 equivalent

C-chamfered | Precision
P・W $^{0}_{-0.005}$
Free designation

C-CHAMFERED PRECISION RECTANGULAR EJECTOR PINS

—FREE DESIGNATION TYPE—

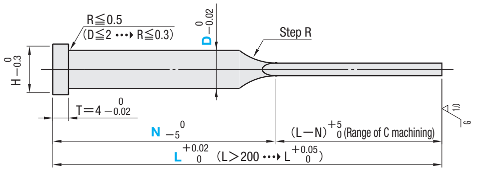


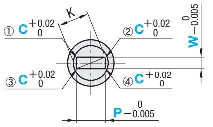


RoHS

Part Number			Head Thickness	T P・W
1 place is chamfered.	2 places are chamfered.	4 places are chamfered.		
ERVF1AC ERVF1BC	ERVF2AC ERVF2BC ERVF2CC ERVF2DC	ERVF4AC	4mm(T4)	$^{0}_{-0.005}$

No. of C	Shape	C parts			
		①Upper left	②Upper right	③Lower left	④Lower right
1	1AC	①	—	—	—
	1BC	—	②	—	—
2	2AC	①	②	—	—
	2BC	①	—	③	—
	2CC	①	—	—	④
	2DC	—	②	③	—
4	4AC	①	②	③	④





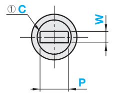
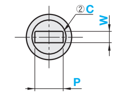
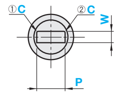
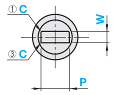
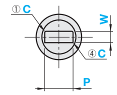
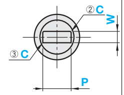
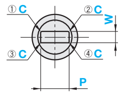
C position is selected from C–position selection **Shape** .
P≧W K=$\sqrt{P^2+W^2}$ (Dimension before C processing)

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)

M SKH51 equivalent
H 58～60HRC

Range of guaranteed base material hardness (Details **P.1303**)

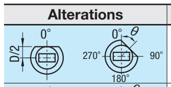
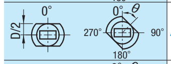
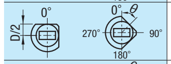
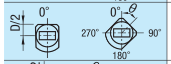
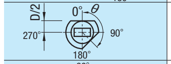
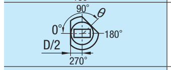
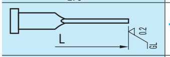
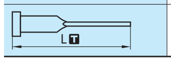
■C-position Designation

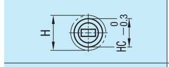
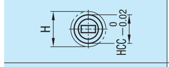
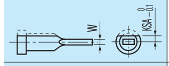
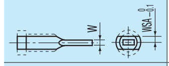
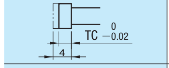
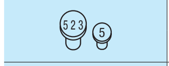
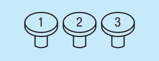
Shape						
One place of C		Two places of C				Four places of C
1AC	1BC	2AC	2BC	2CC	2DC	4AC
① Upper left	② Upper right	① Upper left ② Upper right	① Upper left ③ Lower left	① Upper left ④ Lower right	② Upper right ③ Lower left	4 places
						

Alterations

Part Number — L — P — W — C — N — (AKC・AWC···etc.)
ERVF2AC4 — 150.00 — P3.0 — W1.0 — C0.1 — N60 — AKC90

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	TMC	Lapping on the tip face	
	LKC	L dimension tolerance alteration L $^{+0.02}_{0}$ ···› $^{+0.01}_{0}$ Available when L≦200	

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments 2.0≦TC<4 (Dimensions L and N remain unchanged) 4−TC≦Lmax.−L	
	NHC	Numbering on the head How to order **P.196**	
	NHN	Automatic sequential numbering on the head How to order **P.196**	

Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number			0.01mm increments			C	Kmax.	N 1mm increments	Nmin.
		Type	Shape	D	L	P	W				
3	4	ERVF (4mm head)	1AC 1BC 2AC 2BC 2CC 2DC 4AC	1.5	50.00～250.00	0.60～ 1.30	0.30～	0.06 0.1 0.15 0.2 0.3 C≦$\frac{W}{2}$−0.07	1.4	20≦(L−N)≦200	23
4				2		0.80～ 1.80			1.9		
5				2.5		0.80～ 2.30			2.4		26
6				3		0.80～ 2.80			2.9		27
7				3.5		1.00～ 3.30			3.4		
				4		1.00～ 3.80			3.9		29
8				4.5		1.20～ 4.30	0.40～		4.4		
				5		1.50～ 4.80			4.9		31
9				5.5		1.80～ 5.30	0.50～		5.4		
				6		2.00～ 5.80			5.9		33
10				7		2.30～ 6.80			6.9		40
11				8		2.30～ 7.80			7.9		
15				10		3.00～ 9.80			9.9		
17				12		3.50～11.80	0.80～		11.9		

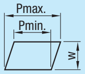
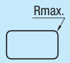
Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$(Dimension before C processing) P≧W Select C dimension from the range of C≦$\frac{W}{2}$−0.07.

Order

Part Number	L	P	W	C	N
ERVF2AC4	150.00	P3.0	W1.0	C0.1	N60

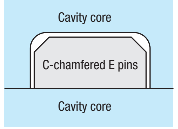
Days to Ship Quotation

Price Quotation

Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details **P.1313**)

Example

Separable Piece



- As a result of C-chamfering machining, a clearance between the E pin and the cavity core becomes larger, enabling this construction to be used as a gas vent as well.
- C-chamfering machining is performed as far as the step R(L−N), enabling the extra machining of gas vent to be omitted.

When using a highly fluid resin, resin burrs sometimes occur, so it is recommended using the conventional rectangular ejector pins in such a case.

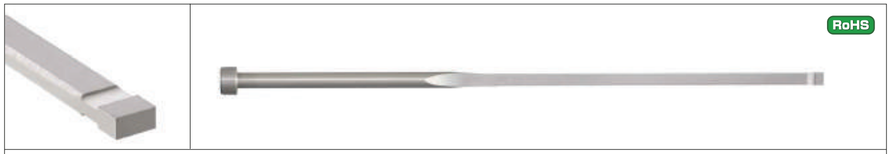
Rectangular Ejector Pins

High Speed Steel SKH51 equivalent

C-chamfered・Precision P・W $^{0}_{-0.005}$ Free designation

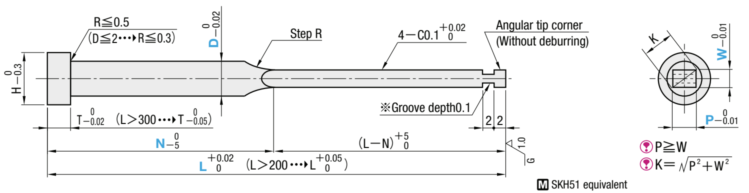
GAS RELEASE RECTANGULAR EJECTOR PINS

— FREE DESIGNATION TYPE —



Part Number	Head Thickness	T P・W
GV−ERF	4mm(T4)	$^{0}_{-0.01}$
GV−ERJF	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
K=$\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58〜60HRC
Range of guaranteed base material hardness (Details P.1303)

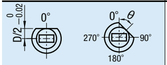
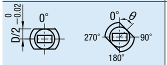
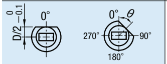
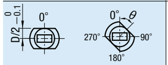
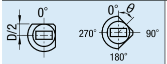
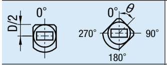
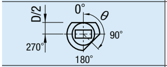
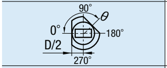
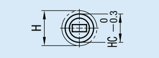
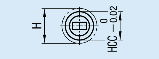
※When W<1.5, the groove depth is 0.05.
Details of the tip: see below of the right page

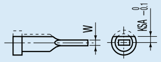
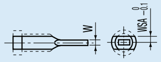
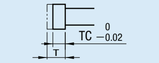
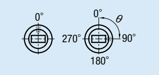
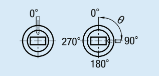
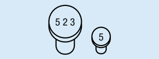
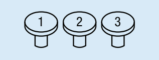
Alterations

Part Number	−	L	−	P	−	W	−	N	−	(AKC・AWC···etc.)
GV−ERF5.5	−	105.03	−	P3.50	−	W1.50	−	N50	−	AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK	VAK=45° increments 0≦VAK<360 ⊗ Combination with KSA/WSA not available.	
	VAW	VAW=45° increments 0≦VAW<360 ⊗ Combination with KSA/WSA not available.	
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	

Alterations	Code	Spec.	1Code
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T Dimensions N becomes shorter by (T−TC). (Dimension L remains unchanged.) T−TC≦Lmax.−L	Quotation
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order P.195	
	NCW	Dowel hole+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			Kmax.	N 1mm increments	Nmin.
H	T	H	T	4mm head	JIS head	D	L	P	W			
3	4	3	4	GV−ERF	GV−ERJF	1.5	40.00〜250.00	1.00〜 1.30	1.00〜	1.4	10≦(L−N)≦250	23
4		4				2	40.00〜300.00	1.00〜 1.80		1.9		
5		5				2.5		1.00〜 2.30		2.4		26
6		6				3		1.00〜 2.80		2.9		27
7		7				3.5		1.00〜 3.30		3.4		
		8	6			4	40.00〜300.00 (40.00〜350.00)	1.00〜 3.80		3.9		29
8						4.5		1.20〜 4.30		4.4		
		9				5	50.00〜300.00 (50.00〜350.00)	1.50〜 4.80		4.9		31
9						5.5		1.80〜 5.30		5.4		
		10				6		2.00〜 5.80		5.9		33
10		11				6.5		2.00〜 6.30		6.4		40
						7		2.30〜 6.80		6.9		
11		13	8			8		2.30〜 7.80		7.9		
15		15				10		3.00〜 9.80		9.9		
—	—	17		—		12		3.50〜11.80		11.9		
		20				15		3.50〜14.80		14.9		

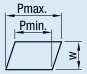
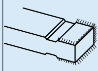
Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ P≧W L dimension in ( ) will be available for GV−ERJF.

Order

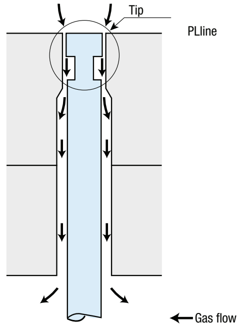
Part Number	−	L	−	P	−	W	−	N
GV−ERF5.5	−	105.03	−	P3.50	−	W1.50	−	N55

Days to Ship Quotation

Price Quotation

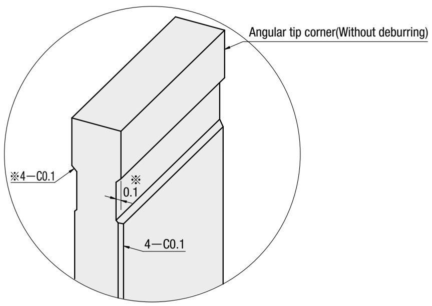
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Approximately within 2mm from the tip is without deburring process.

Example



- The tip section releases gas through the clearance, and the gas can be more smoothly released under the groove through effects of C chamfering.
- Stress concentration is relieved and made hard to break through C chamfering.

・**Details of the tip**



※When W<1.5,0.05.

High Speed Steel
SKH51 equivalent

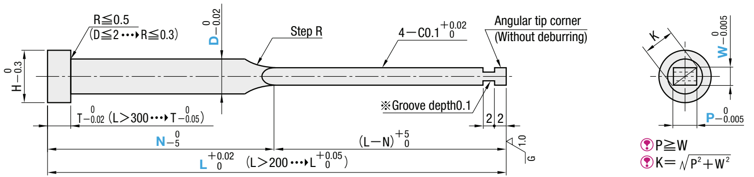
PRECISION GAS RELEASE RECTANGULAR EJECTOR PINS

— FREE DESIGNATION TYPE —

RoHS

Part Number	Head Thickness	T P・W
GV—ERVF	4mm(T4)	$^{0}_{-0.005}$
GV—ERVJ	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
$K=\sqrt{P^2+W^2}$
M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

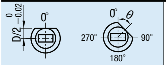
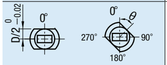
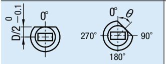
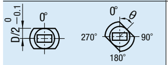
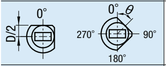
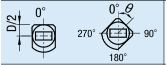
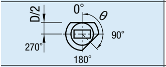
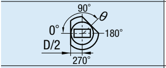
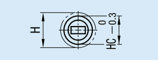
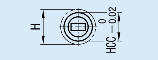
※When W<1.5, the groove depth is 0.05.
Details of the tip: see below of the right page

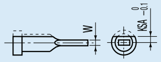
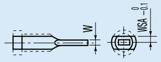
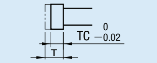
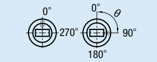
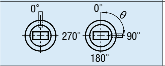
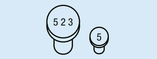
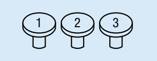
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC···etc.)
GV—ERVF5.5	—	105.03	—	P3.50	—	W1.50	—	N50	—	AWC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	VAK	VAK=45° increments 0≦VAK<360 Combination with KSA/WSA not available.	
	VAW	VAW=45° increments 0≦VAW<360 Combination with KSA/WSA not available.	
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H, D≧1.5	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	

Alterations	Code	Spec.	1Code
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments /2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T Dimensions N becomes shorter by (T−TC). (Dimension L remains unchanged.) T−TC≦Lmax.−L	Quotation
	NC	Dowel hole boring Available when H≧4 Combination with other thanNHC・NHN not available. How to order P.195	
	NCW	Dowel hole+Spring pin driving Available when H≧4 Combination with other than NHC・NHN not available. How to order P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			Kmax.	N	Nmin.
H	T	H	T	4mm head	JIS head	D	L	P	W		1mm increments	
3	4	3	4	GV—ERVF	GV—ERVJ	1.5	40.00～250.00	1.00～ 1.30	1.00～	1.4	10≦(L−N)≦250	23
4		4				2	40.00～300.00	1.00～ 1.80		1.9		
5		5				2.5		1.00～ 2.30		2.4		26
6		6				3		1.00～ 2.80		2.9		27
7		7				3.5		1.00～ 3.30		3.4		
		8	6			4	40.00～300.00 (40.00～350.00)	1.00～ 3.80		3.9		29
8						4.5		1.20～ 4.30		4.4		
		9				5	50.00～300.00 (50.00～350.00)	1.50～ 4.80		4.9		31
9						5.5		1.80～ 5.30		5.4		
		10				6		2.00～ 5.80		5.9		33
10		11				6.5		2.00～ 6.30		6.4		40
						7		2.30～ 6.80		6.9		
11		13	8			8		2.30～ 7.80		7.9		
15		15				10		3.00～ 9.80		9.9		
—	—	17		—		12		3.50～11.80		11.9		
		20				15		3.50～14.80		14.9		

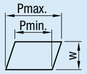
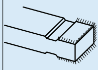
Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ P≧W L dimension in ( ) will be available for GV—ERVJ.

Order

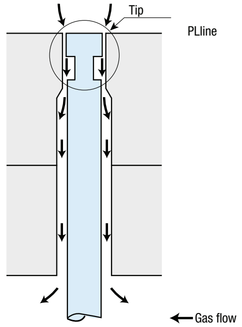
Part Number	—	L	—	P	—	W	—	N
GV—ERVF5.5	—	105.03	—	P3.50	—	W1.50	—	N50

Days to Ship Quotation

Price Quotation

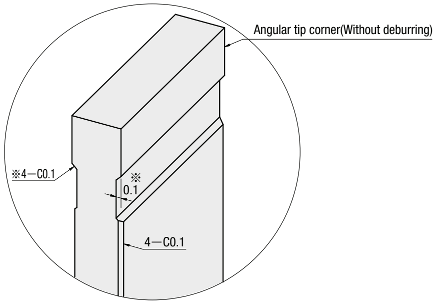
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Approximately within 2mm from the tip is without deburring process.

Example



- The tip section releases gas through the clearance, and the gas can be more smoothly released under the groove through effects of C chamfering.
- Stress concentration is relieved and made hard to break through C chamfering.

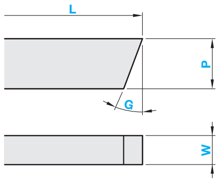
・**Details of the tip**



※When W<1.5,0.05.

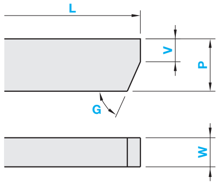
SHAPE VARIATIONS OF RECTANGULAR EJECTOR PINS WITH TIP PROCESS

1X Bezel・Angle designation



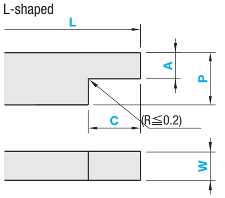
- 1°≦G≦45°

2X Partial bezel・Angle designation



- 45°≦G≦90°
- 0.3≦V<P

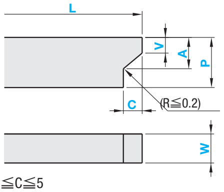
3X L-shaped



- 0.5≦C≦5
- 0.3≦A<P

⊗R designation not available.

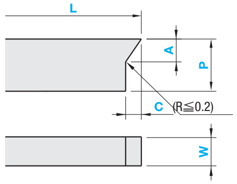
4X Trapezoid



- 0.5≦C≦5
- 0.1≦V≦A
- A<P

⊗R designation not available.

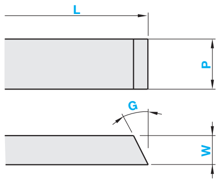
5X L-shaped・Tapered



- 0.5≦C≦5
- 0.3≦A<P

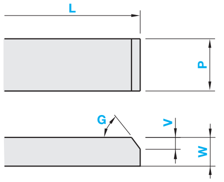
⊗R designation not available.

1Y Bezel・Angle designation



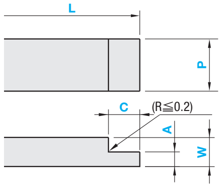
- 1°≦G≦45°

2Y Partial bezel・Angle designation



- 45°≦G≦90°
- 0.3≦V<W

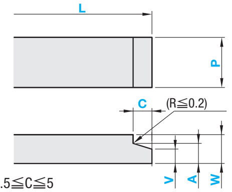
3Y L-shaped



- 0.5≦C≦5
- 0.3≦A<W

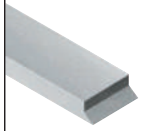
⊗R designation not available.

4Y Trapezoid

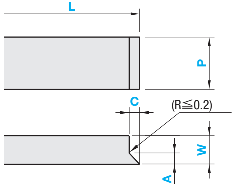


- 0.5≦C≦5
- 0.1≦V≦A
- A<W

⊗R designation not available.

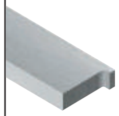


5Y L-shaped・Tapered

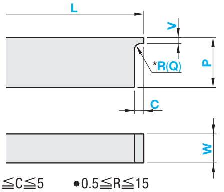


- 0.5≦C≦5
- 0.3≦A<W

⊗R designation not available.



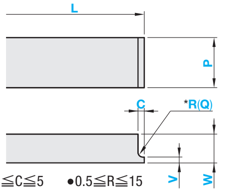
6X L-shaped・Rdesignation



- 0.3≦C≦5
- 0.1≦V≦ $\frac{P}{2}$
- 0.5≦R≦15

*For R processing (P.239, 257) designate R dimension with Q dimension.

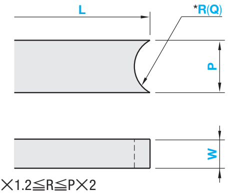
6Y L-shaped・Rdesignation



- 0.3≦C≦5
- 0.1≦V≦ $\frac{W}{2}$
- 0.5≦R≦15

*For R processing (P.239, 257) designate R dimension with Q dimension.

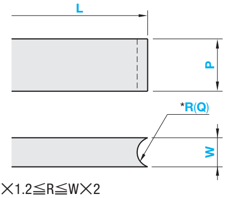
7X R groove



- P×1.2≦R≦P×2

*For R processing (P.239, 257) designate R dimension with Q dimension.

7Y R groove



- W×1.2≦R≦W×2

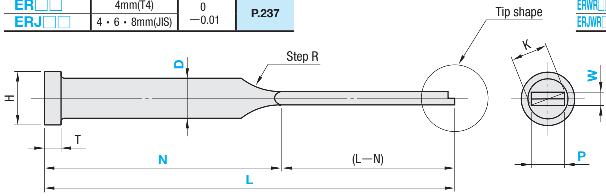
*For R processing (P.239, 257) designate R dimension with Q dimension.

・**Regular product**

Part Number	Head Thickness	T P・W	Page
ERV□□	4mm(T4)	0 −0.005	P.241
ERVJ□□	4・6・8mm(JIS)		
ER□□	4mm(T4)	0 −0.01	P.237
ERJ□□	4・6・8mm(JIS)		

・**R-chamfered**

Part Number	Head Thickness	T P・W	Page
ERVWR□□ ERVFR□□	4mm(T4)	0 −0.005	P.243
ERVJWR□□ ERVJFR□□	4・6・8mm(JIS)		
ERWR□□ ERFR□□	4mm(T4)	0 −0.01	P.239
ERJWR□□ ERJFR□□	4・6・8mm(JIS)		

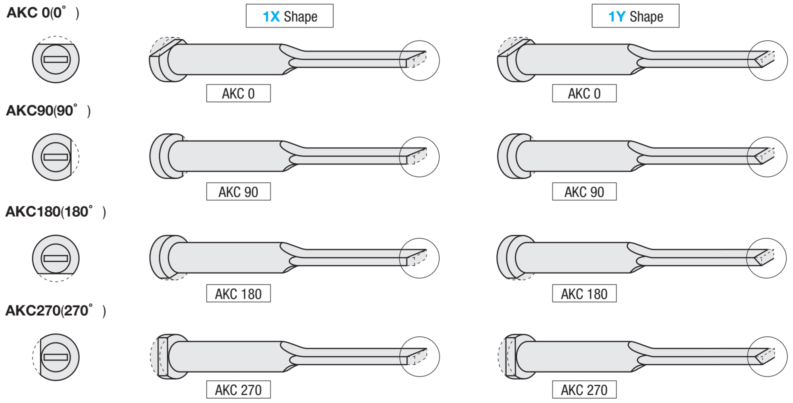

Tip shape
Step R
D
H
T
N
(L−N)
L
K
W
P

■**Unit of designation**

T		Unit of designation
G	±10′′	1° increments
R(Q)	±0.05	0.1mm increments
A	±0.02	0.01mm increments
V	±0.02	0.01mm increments
C	±0.02	0.01mm increments

*For R processing(P.239, P.243) designate R dimension with Q dimension.

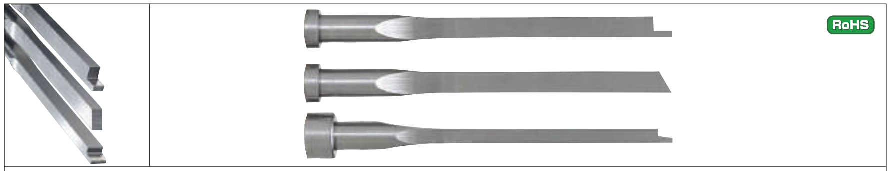
Rectangular Ejector Pins with Tip Process・Head Cutting Position


AKC 0(0°)
AKC90(90°)
AKC180(180°)
AKC270(270°)
1X Shape
1Y Shape
AKC 0
AKC 0
AKC 90
AKC 90
AKC 180
AKC 180
AKC 270
AKC 270

High Speed Steel
SKH51 equivalent

Shape processing
P・W $^{0}_{-0.01}$
Free designation

RECTANGULAR EJECTOR PINS WITH TIP PROCESS

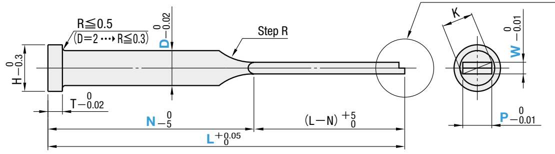


Part Number	Head Thickness	T P・W
ER□X・ER□Y	4mm(T4)	$^{0}_{-0.01}$
ERJ□X・ERJ□Y	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

T	Unit of designation
G±10′	1° increments
R±0.05	0.1mm increments
A±0.02	0.01mm increments
V±0.02	0.01mm increments
C±0.02	0.01mm increments

Select a tip shape from P.235・236



P≧W,　$K=\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

Part Number				L		P		W		N		In the order of V・A・C・R・G
Type	Tip shape	D	—		—		—		—		—	
ER	1X	4	—	150.00	—	P3.00	—	W1.00	—	N50	—	G15

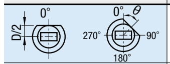
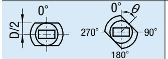
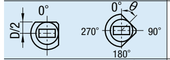
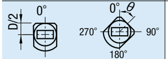
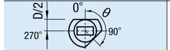
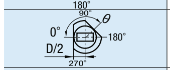
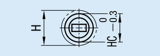
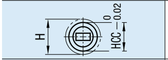
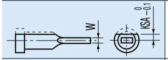
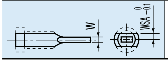
Days to Ship Quotation

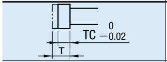
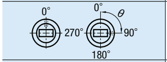
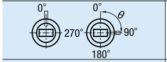
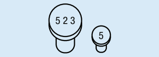
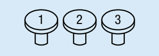
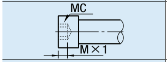
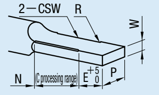
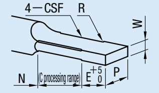
Alterations

Part Number — L — P — W — N — In the order of V・A・C・R・G — (AKC・AWC・NHC⋯etc.)
ER1X4 — 150.00 — P3.00 — W1.00 — N50 — G15 — NHC−3

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	Quotation
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T (Dimension L and N remain unchanged.)	
	NC	Dowel hole boring NC=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	Quotation
	MC	Tapping D8・8.5 ⋯› M4 D10・10.5 ⋯› M5 ERJA vailable when D≧8 Only available combination is with CSW・CSF	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

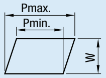
Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type	Part Number Tip shape	Part Number D	0.01mm increments L	0.01mm increments P	0.01mm increments W	Kmax.	N 1mm increments	Nmin.
4	4	4	4	ER (4mm head) ERJ (JIS Head)	1X 1Y 2X 2Y 3X 3Y 4X 4Y 5X 5Y 6X 6Y 7X 7Y	2	50.00～250.00	0.80～ 1.80	0.60～	1.9	(L−N)≧20 (L−N)≦200	N≧33 (L>200 ⋯› N≧50)
5		5				2.5		0.80～ 2.30		2.4		
6		6				3	50.00～300.00	1.00～ 2.80		2.9		
7		7				3.5		1.00～ 3.30		3.4		
		8	6			4		1.00～ 3.80		3.9		
8						4.5		1.20～ 4.30		4.4		
		9				5		1.50～ 4.80		4.9		
9						5.5		1.80～ 5.30	0.80～	5.4		
		10				6		2.00～ 5.80		5.9		
10		11				6.5		2.00～ 6.30		6.4		N≧40 (L>200 ⋯› N≧50)
						7		2.30～ 6.80		6.9		
11		13	8			8		2.30～ 7.80		7.9		
14		14				8.5		2.30～ 8.30		8.4		
15		15				10		3.00～ 9.80		9.9		
17		17				10.5		3.00～10.30		10.4		

Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$　P≧W　Select a tip shape for 1X～7Y P.235・236

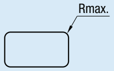
■Precision Standard

Squareness of the tip corner



W plane as the base
(Pmax.−Pmin.)≦0.02

Corner R value of the tip corner



Rmax.≦0.03 (Trimming R)
The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

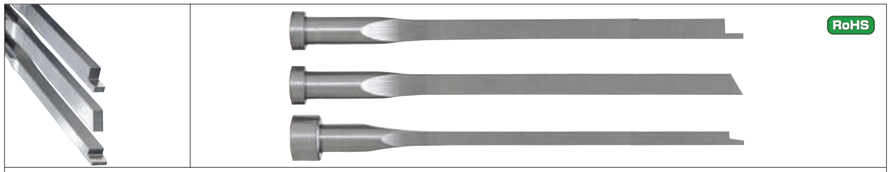
Price Quotation

Rectangular Ejector Pins

High Speed Steel
SKH51 equivalent

Shape processing
P・W $^{0}_{-0.01}$
Free designation

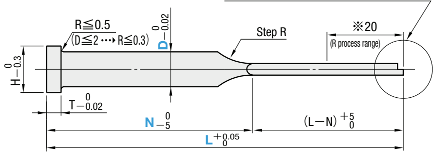
R-CHAMFERED RECTANGULAR EJECTOR PINS WITH TIP PROCESSED



Part Number		R position	Head Thickness	T P・W
ERWR□X	ERWR□Y	2 places on the upper side are rounded.	4mm(T4)	$^{0}_{-0.01}$
ERFR□X	ERFR□Y	4 places are rounded.		
ERJWR□X	ERJWR□Y	2 places on the upper side are rounded.	4・6・8mm(JIS)	
ERJFR□X	ERJFR□Y	4 places are rounded.		

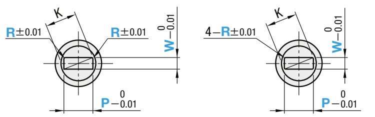
T	Unit of designation
G±10′	1° increments
R±0.05	0.1mm increments
A±0.02	0.01mm increments
V±0.02	0.01mm increments
C±0.02	0.01mm increments

Select a tip shape from P.235・236



(2 places on the upper side are rounded.)
ERWR□X ERWR□Y
ERJWR□X ERJWR□Y

(4 places are rounded.)
ERFR□X ERFR□Y
ERJFR□X ERJFR□Y



P≧W K=$\sqrt{P^2+W^2}$
(Dimension before R processing)

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

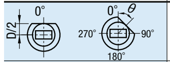
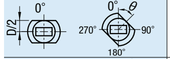
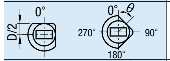
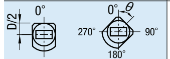
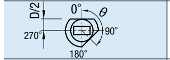
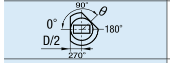
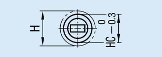
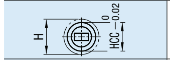
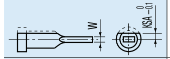
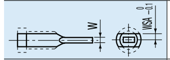
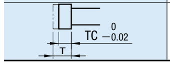
※R processing includes the tip processing part.

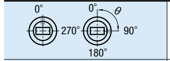
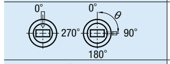
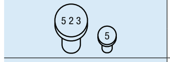
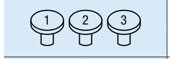
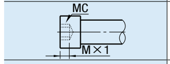
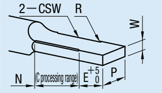
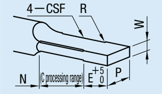
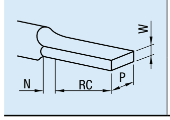
M SKH51 equivalent
H 58〜60HRC
Range of guaranteed base material hardness (Details P.1303)

Alterations

Part Number — L — P — W — R — N — V・In the order of A・C・Q・G — (AKC・AWC・NHC···etc.)
ERWR1X4 — 150.00 — P3.00 — W1.00 — R0.1 — N50 — G15 — NHC−3

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments /2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T (Dimension L and N remain unchanged.)	

Alterations	Code	Spec.	1Code
	NC	Dowel hole boring NC=90° increments ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	MC	Tapping D8 ··· M4 D10 ··· M5 ERJWR ERJFR Available when D≧8 Only available combination is with CSW・CSF	Quotation
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	
	RC	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2
E=1mm increments
5≦E≦(L−N)−20
R process range P.196

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number				0.01mm increments			R	Kmax.	N	Nmin.
H	T	H	T	Type 4mm head	Type JIS head	Tip shape	D	L	P	W			1mm increments	
4	4	4	4	ERWR (2 places on the upper side are rounded.) ERFR (4 places are rounded.)	ERJWR (2 places on the upper side are rounded.) ERJFR (4 places are rounded.)	1X 1Y 2X 2Y 3X 3Y 4X 4Y 5X 5Y 6X 6Y 7X 7Y	2	50.00〜250.00	0.80〜1.80	0.60〜	0.1	1.9	20≦(L−N)≦200	N≧33 (L>200 ··· N≧50)
5		5					2.5		0.80〜2.30			2.4		
6		6					3	50.00〜300.00	1.00〜2.80			2.9		
7		7					3.5		1.00〜3.30		0.15	3.4		
		8	6				4		1.00〜3.80			3.9		
8							4.5		1.20〜4.30		0.2	4.4		
		9					5		1.50〜4.80			4.9		
9							5.5		1.80〜5.30	0.80〜	0.3	5.4		
		10					6		2.00〜5.80			5.9		
10		11					6.5		2.00〜6.30			6.4		N≧40 (L>200 ··· N≧50)
							7		2.30〜6.80		R≦$\frac{W}{2}$−0.05	6.9		
11		13	8				8		2.30〜7.80			7.9		
15		15					10		3.00〜9.80			9.9		

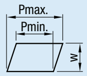
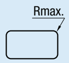
Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ (Dimension before R processing) P≧W Select R dimension from the range of R≦$\frac{W}{2}$−0.05.

Order

Part Number (Type Tip shape D) — L — P — W — R — N — V・In the order of A・C・Q・G
ERWR 1X 4 — 150.00 — P3.00 — W1.00 — R0.1 — N50 — G15

Days to Ship Quotation

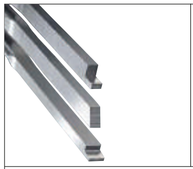
Price Quotation

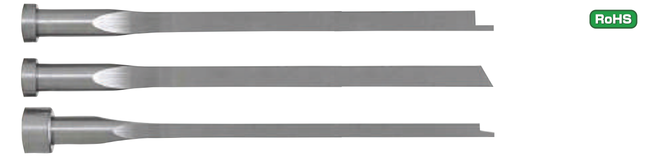
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

High Speed Steel
SKH51 equivalent

Shape processing
Precision
P・W $^{0}_{-0.005}$
Free designation

PRECISION RECTANGULAR EJECTOR PINS WITH TIP PROCESS





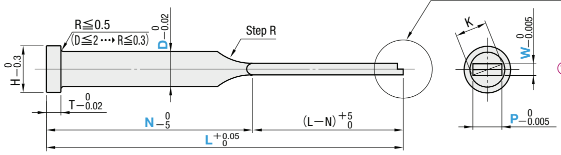
RoHS

Part Number	Head Thickness	T P・W
ERV□X・ERV□Y	4mm(T4)	$^{0}_{-0.005}$
ERVJ□X・ERVJ□Y	4・6・8mm(JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

T	Unit of designation
G±10′	1° increments
R±0.05	0.1mm increments
A±0.02	0.01mm increments
V±0.02	0.01mm increments
C±0.02	0.01mm increments

Select a tip shape from P.235・236



P≧W, $K=\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

Part Number											
Type	Tip shape	D	— L	—	P	—	W	—	N	—	In the order of V・A・C・R・G
ERV	1X	4	— 150.00	—	P3.00	—	W1.00	—	N50	—	G15

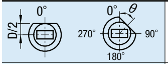
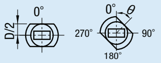
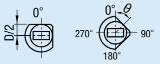
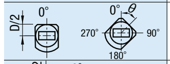
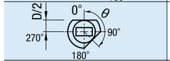
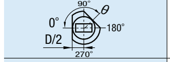
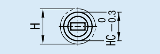
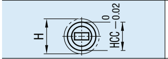
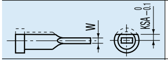
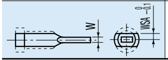
Days to Ship Quotation

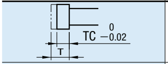
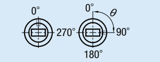
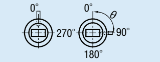
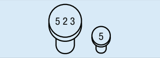
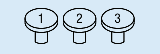
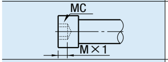
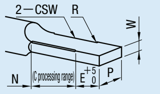
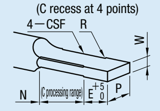
Alterations

Part Number — L — P — W — N — In the order of V・A・C・R・G — (AKC・AWC⋯etc.)
ERV1X4 — 150.00 — P3.00 — W1.00 — N50 — G15 — NHC—3

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T (Dimension L and N remain unchanged.)	Quotation
	NC	Dowel hole boring NC=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Available when H≧4 ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	MC	Tapping D8 ⋯→ M4 D10 ⋯→ M5 ERVJ Available when D≧8 Only available combination is with CSW・CSF	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1—E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5—E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

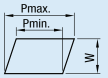
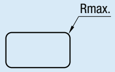
P≧1.5
CSW, CSF<W/2
E=1mm increments
5≦E≦(L−N)−20

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number			0.01mm increments			Kmax.	N	Nmin.
H	T	H	T	Type	Tip shape	D	L	P	W		1mm increments	
3	4	—	—	**ERV** (4mm head) **ERVJ** (JIS Head)	1X 1Y 2X 2Y 3X 3Y 4X 4Y 5X 5Y 6X 6Y 7X 7Y	*1.5	50.00~250.00	0.80~1.30	0.60~	1.4	(L−N)≧20 (L−N)≦200	N≧33 (L>200 ⋯→ N≧50)
4		4	4			2		0.80~1.80		1.9		
5		5				2.5		0.80~2.30		2.4		
6		6				3	50.00~300.00	1.00~2.80		2.9		
7		7				3.5		1.00~3.30		3.4		
		8	6			4		1.00~3.80		3.9		
8						4.5		1.20~4.30		4.4		
		9				5		1.50~4.80		4.9		
9						5.5		1.80~5.30	0.80~	5.4		
		10				6		2.00~5.80		5.9		
10		11				6.5		2.00~6.30		6.4		N≧40 (L>200 ⋯→ N≧50)
						7		2.30~6.80		6.9		
11		13	8			8		2.30~7.80		7.9		
15		15				10		3.00~9.80		9.9		

*D1.5 is only for ERV□□ Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ P≧W Select a tip shape for 1X~7Y P.235・236

■ Precision Standard

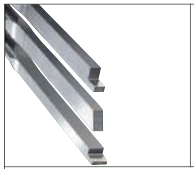
Squareness of the tip corner	Corner R value of the tip corner
 W plane as the base (Pmax.—Pmin.)≦0.01	 Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

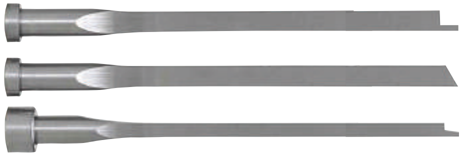
Price Quotation

High Speed Steel
SKH51 equivalent

Shape processing | Precision
P・W $^{0}_{-0.005}$
Free designation

PRECISION R-CHAMFERED RECTANGULAR EJECTOR PINS WITH TIP PROCESSED



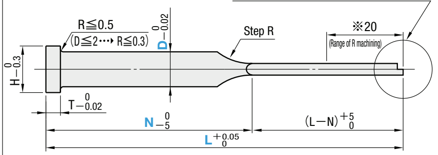


RoHS

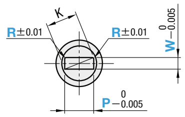
Part Number		R position	Head Thickness	🅣 P・W
ERVWR□X	ERVWR□Y	2 places on the upper side are rounded.	4mm(T4)	$^{0}_{-0.005}$
ERVFR□X	ERVFR□Y	4 places are rounded.		
ERVJWR□X	ERVJWR□Y	2 places on the upper side are rounded.	4・6・8mm(JIS)	
ERVJFR□X	ERVJFR□Y	4 places are rounded.		

🅣	Unit of designation
G±10′	1° increments
R±0.05	0.1mm increments
A±0.02	0.01mm increments
V±0.02	0.01mm increments
C±0.02	0.01mm increments

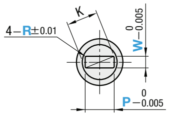
Select a tip shape from P.235・236



(2 places on the upper side are rounded.)
ERVWR□X ERVWR□Y
ERVJWR□X ERVJWR□Y



(4 places are rounded.)
ERVFR□X ERVFR□Y
ERVJFR□X ERVJFR□Y



P≧W K=$\sqrt{P^2+W^2}$ (Dimension before R processing)

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

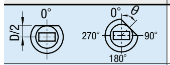
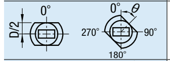
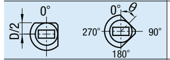
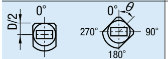
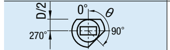
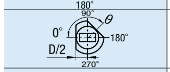
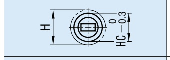
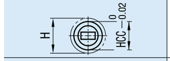
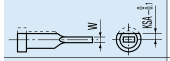
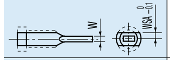
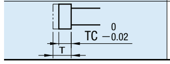
Ⓜ SKH51 equivalent
Ⓗ 58∼60HRC
Range of guaranteed base material hardness (Details P.1303)

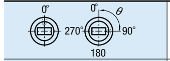
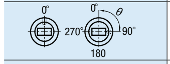
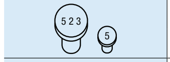
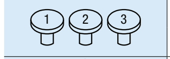
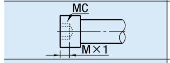
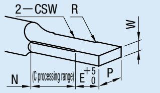
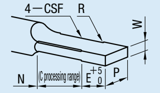
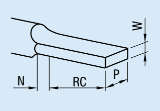
※R processing includes the tip processing part.

Alterations

Part Number	—	L	—	P	—	W	—	R	—	N	—	V・In the order of A・C・Q・G	—	(AKC・AWC・NHC⋯etc.)
ERVWR1X4	—	150.00	—	P3.00	—	W1.00	—	R0.1	—	N50	—	G15	—	NHC−3

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	Quotation
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments T/2≦TC<T (Dimension L and N remain unchanged.)	

Alterations	Code	Spec.	1Code
	NC	Dowel hole boring NC=90° increments ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments ⊗ Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	MC	Tapping D8 ⋯› M4 D10 ⋯› M5 ERVJWR・ERVJFR Available when D≧8 Only available combination is with CSW・CSF	Quotation
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 — CSW, CSF: 0.3 W: W≧1.5 — CSW, CSF: 0.5, 1, 1.5	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20 R process range P.196	
	RC	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed	

Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Tip shape	D	0.01mm increments L	0.01mm increments P	0.01mm increments W	R	Kmax.	N 1mm increments	Nmin.
4	4	4	4	ERVWR (2 places on the upper side are rounded.) ERVFR (4 places are rounded.)	ERVJWR (2 places on the upper side are rounded.) ERVJFR (4 places are rounded.)	1X 1Y 2X 2Y 3X 3Y 4X 4Y 5X 5Y 6X 6Y 7X 7Y	2	50.00∼250.00	0.80∼1.80	0.60∼	0.1	1.9	20≦(L−N)≦200	N≧33 (L>200 ⋯› N≧50)
5		5					2.5		0.80∼2.30			2.4		
6		6					3	50.00∼300.00	1.00∼2.80			2.9		
7		7					3.5		1.00∼3.30		0.15	3.4		
		8	6				4		1.00∼3.80			3.9		
8							4.5		1.20∼4.30		0.2	4.4		
		9					5		1.50∼4.80			4.9		
9							5.5		1.80∼5.30	0.80∼	0.3	5.4		
		10					6		2.00∼5.80			5.9		
10		11					6.5		2.00∼6.30			6.4		N≧40 (L>200 ⋯› N≧50)
							7		2.30∼6.80		R≦$\frac{W}{2}$−0.05	6.9		
11		13	8				8		2.30∼7.80			7.9		
15		15					10		3.00∼9.80			9.9		

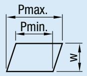
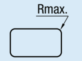
Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ (Dimension before R processing) P≧W Select R dimension from the range of R≦$\frac{W}{2}$−0.05.

Order

Part Number Type	Tip shape	D	—	L	—	P	—	W	—	R	—	N	—	V・In the order of A・C・Q・G
ERVWR	1X	4	—	150.00	—	P3.00	—	W1.00	—	R0.1	—	N50	—	G15

Days to Ship Quotation

Price Quotation

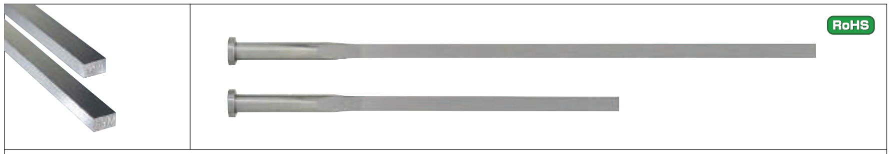
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

High Speed Steel
SKH51 equivalent

With Engraving
$P \cdot W_{-0.01}^{0}$
Free designation

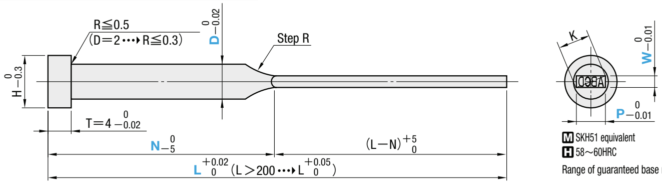
RECTANGULAR EJECTOR PINS WITH ENGRAVING

Non JIS material definition is listed on P.1351 - 1352


RoHS

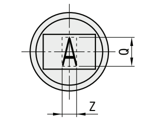
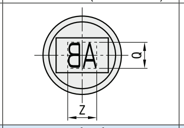
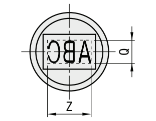
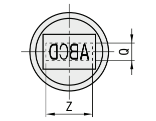
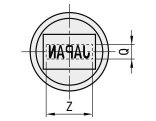
Part Number	Head Thickness	T P・W
ERF□M (Sequential numbering designation) ERF□MR	4mm	$_{-0.01}^{0}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
$K=\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)

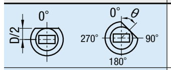
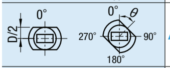
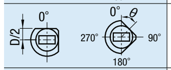
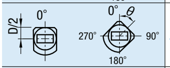
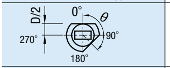
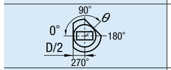
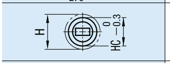
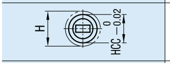
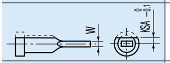
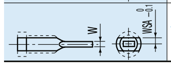
1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
				
0.80≦P≦10.30	2.30≦P≦10.30	3.10≦P≦10.30	3.90≦P≦10.30	5.00≦P≦10.30

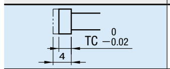
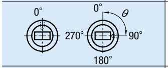
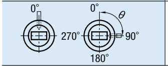
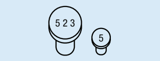
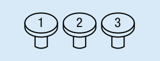
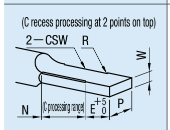
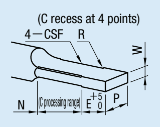
Alterations

Part Number — L — P — W — N — Characters for engraving (0~9,A~Z,／＞＜＋－⬚・.) — (AKC・AWC⋯etc.)
ERF3M 5 — 120.25 — P3.50 — W1.5 — N60 — MY3 — AWC 60

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 (Dimensions L and N remain unchanged) 4−TC≦Lmax.−L	Quotation
	NC	Dowel hole boring NC=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Unit of designation CSW1−E25	
	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Unit of designation CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

H	Part Number Type	Character	D	0.01mm increments L	P	W	Kmax.	N 1mm increments	Nmin.	Characters for engraving (Round Gothic type)
4	ERF	1M 2M 3M 4M 5M Sequential numbering designation 1MR 2MR	2	40.00~250.00	0.80~ 1.70	0.30~	1.9	10≦(L−N)≦200	23	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
5			2.5		0.80~ 2.20		2.4		26	
6			3		1.00~ 2.70		2.9		27	
7			3.5		1.00~ 3.20		3.4			
			4		1.00~ 3.70		3.9		29	
8			4.5		1.20~ 4.20		4.4			
			5	50.00~250.00	1.50~ 4.80	0.40~	4.9		31	
9			5.5		1.80~ 5.30		5.4			
			6		2.00~ 5.80	0.50~	5.9		33	
10			6.5		2.00~ 6.30		6.4		40	
			7		2.30~ 6.80		6.9			
11			8		2.30~ 7.80		7.9			
14			8.5		2.30~ 8.30		8.4			
15			10		3.00~ 9.80		9.9			
17			10.5		3.00~10.30		10.4			

Name	Slash	Greater	Less
Characters for engraving	／	＞	＜
Order code	¥	＞	＜

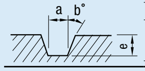
Name	Plus	Minus	Space
Characters for engraving	＋	－	⬚
Order code	＋	#	%

Name	Centered dot	Period
Characters for engraving	・	.
Order code	@	&

- Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ P≧W
- Use ¥ for indicating ／ (slash), # for — (minus), % for ⬚ (space), @ for ・ (centered dot), and & for . (period)
- 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
- In case of 1MR,"0" is next to "9" while "A" is next to "Z".
- In case of 2MR, the ones digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the tens digit is increased by one.
- ⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.
- When placing the order for 5 pieces of ERF1MR2−150−P1.5−W0.5−N70−1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of ERF1MR3−150−P2.5−W1.2−N70−Z, characters for engraving "Z A B"
- When placing the order for 4 pieces of ERF2MR4−100−P3.0−W2.0−N50−01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of ERF2MR4−100−P3.5−W2.2−N50−A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of ERF2MR6−150−P5.0−W2.6−N70−, characters for engraving "1X 1Y 1Z 2A 2B 2C"

Ejector pins	Finished products
Reversed reading (Concave character)	Normal character (Convex character)

Details of engraving



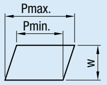
Width of engraving (a)	0.1×Q~0.2×Q
Angle of engraving (b°)	35° ±2°
Depth of engraving (e)	・When P≦0.99 0.03±0.01 ・When P≧1.00 0.05±0.02

■Relationship between Dimension (P) and Character Size (Q,Z)

P (Horizontal size)	W (Vertical size)	Q (Character Height)	Z(Character Width) 1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
P≧Z+0.2	0.30~ 0.39	0.2	0.1	0.6	0.9	1.2	1.5
	0.40~ 0.49	0.25	0.15	0.65	1	1.3	1.65
	0.50~ 0.59	0.35	0.2	0.75	1.15	1.5	1.9
	0.60~ 0.79	0.4	0.2	0.8	1.2	1.6	2
	0.80~ 0.99	0.6	0.3	1	1.5	2	2.5
	1.00~ 1.29	0.8	0.4	1.2	1.8	2.4	3
	1.30~ 1.49	1.0	0.5	1.4	2.1	2.9	3.7
	1.50~ 1.99	1.2	0.6	1.6	2.4	3.3	4.2
	2.00~ 2.49	1.5	0.8	2	3.2	4.4	5.6
	2.50~ 3.49	2.0	1.0	2.6	4.2	5.8	7
	3.50~ 4.49	3.0	1.5	3.9	5.9	8	9.7
	4.50~ 5.49	4.0	2.0	5.2	7.5	10.2	12.4
	5.50~10.30	5.0	2.5	6.2	9.0	12.2	14.9

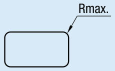
■Precision Standard

Squareness of the tip corner



W plane as the base
(Pmax.−Pmin.)≦0.02

Corner R value of the tip corner



Rmax.≦0.03 (Trimming R)
The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

Order

Part Number Type	Character	D		L		P		W		N		Characters for engraving (0~9, A~Z ／＞＜＋－⬚・.)
ERF	3M	5	—	120.25	—	P3.50	—	W1.5	—	N60	—	MY3

Days to Ship Quotation

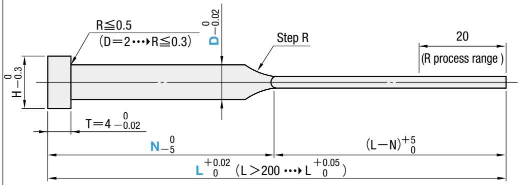
Price Quotation

High Speed Steel
SKH51 equivalent

With Engraving
P・W $^{0}_{-0.01}$
Free designation

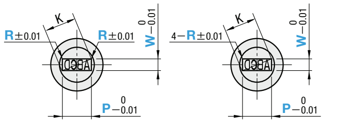
R-CHAMFERED RECTANGULAR EJECTOR PINS WITH ENGRAVING

Part Number		Head Thickness	P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERWR□M ERWR□MR	ERFR□M ERFR□MR	4mm	$^{0}_{-0.01}$



(2 places on the upper side are rounded.)
ERWR□M
ERWR□MR

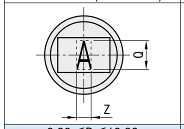
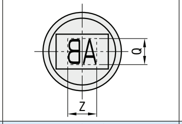
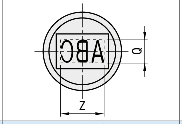
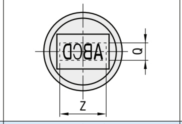
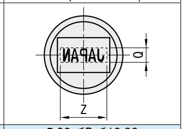
(4 places are rounded.)
ERFR□M
ERFR□MR



P≧W $K=\sqrt{P^2+W^2}$ (Dimension before R processing)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

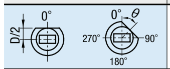
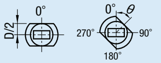
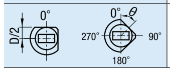
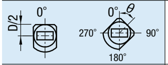
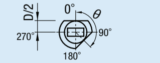
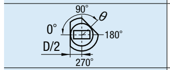
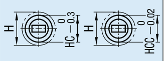
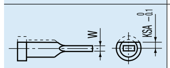
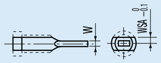
Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

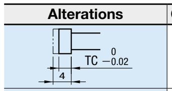
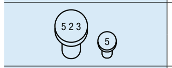
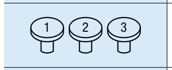
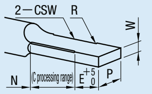
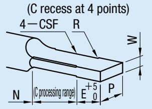
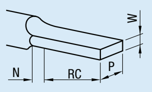
1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
				
0.80≦P≦10.30	2.30≦P≦10.30	3.10≦P≦10.30	3.90≦P≦10.30	5.00≦P≦10.30

Alterations

Part Number — L — P — W — R — N — Characters for engraving (0~9,A~Z,／><+−⬚・.) — (AKC・AWC…etc.)
ERWR3M 5 — 120.25 — P3.50 — W1.50 — R0.1 — N60 — MY3 — AWC 60

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC	HC(HCC)=0.1mm increments ・HC …▸ Head diameter tolerance ・HCC …▸ Head diameter tolerance $^{0}_{-0.02}$ D+1≦HC<H,DH≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 (Dimensions L and N remain unchanged) 4−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 / CSW, CSF: 0.3 W: W≧1.5 / CSW, CSF: 0.5, 1, 1.5 P≧1.5 CSW, CSF<W/2 E=1mm increments 5≦E≦(L−N)−20 R process range P.196	Quotation
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	
	RC	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed	

Non JIS material definition is listed on P.1351 - 1352

H	Part Number: Type	Part Number: Character	Part Number: D	0.01mm increments: L	0.01mm increments: P	0.01mm increments: W	R	Kmax.	N 1mm increments	Nmin.	Characters for engraving (Round Gothic type)
4	ERWR (2 places on the upper side are rounded.) ERFR (4 places are rounded.)	1M 2M 3M 4M 5M (Sequential numbering designation) 1MR 2MR	2	50.00~250.00	0.80~1.80	0.30~	0.1 0.15 0.2 0.3 R≦W/2−0.05	1.9	20≦(L−N)≦200	23	0 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z (others)
5			2.5		0.80~2.30			2.4		26	
6			3		1.00~2.80			2.9		27	
7			3.5		1.00~3.30			3.4			
			4		1.00~3.80			3.9		29	
8			4.5		1.20~4.30			4.4			
			5		1.50~4.80	0.40~		4.9		31	
9			5.5		1.80~5.30			5.4			
			6		2.00~5.80	0.50~		5.9		33	
10			6.5		2.00~6.30			6.4		40	
			7		2.30~6.80			6.9			
11			8		2.30~7.80			7.9			
15			10		3.00~9.80			9.9			

Name	Slash	Greater	Less
Characters for engraving	／	>	<
Order code	¥	>	<

Name	Plus	Minus	Space
Characters for engraving	+	−	⬚
Order code	+	#	%

Name	Centered dot	Period
Characters for engraving	・	.
Order code	@	&

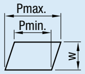
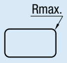
Use ¥ for indicating ／(slash), # for −(minus), % for ⬚(space), @ for ・ (centered dot), and & for . (period).
1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
In case of 1MR,"0" is next to "9" while "A" is next to "Z".
In case of 2MR, the ones digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the tens digit is increased by one.
⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.
- When placing the order for 5 pieces of ERWR1MR2—150—P1.5—W0.5—R0.1—N70—1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of ERWR1MR3—150—P2.5—W1.2—R0.1—N70—Z, characters for engraving "Z A B"
- When placing the order for 4 pieces of ERWR2MR4—100—P3.0—W2.0—R0.1—N50—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of ERWR2MR4—100—P3.5—W2.2—R0.1—N50—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of ERWR2MR6—150—P5.0—W2.6—R0.1—N70—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

Order

Part Number: Type	Part Number: Character	Part Number: D		L		P		W		R		N		Characters for engraving (0~9, A~Z ／><+−⬚・.)
ERWR	3M	5	—	120.25	—	P3.50	—	W1.50	—	R0.1	—	N60	—	MY3

Days to Ship Quotation

Price Quotation

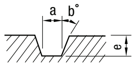
Precision Standard		
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.02
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

■ Relationship between Dimension (P)・(W) and Character Size (Q)・(Z)

P (Horizontal size)	W (Vertical size)	Q (Character Height)	Z(Character Width): 1M・1MR	2M・2MR	3M	4M	5M
P≧Z+0.2	0.30~ 0.39	0.2	0.1	0.6	0.9	1.2	1.5
	0.40~ 0.49	0.25	0.15	0.65	1	1.3	1.65
	0.50~ 0.59	0.35	0.18	0.76	1.14	1.52	1.9
	0.60~ 0.79	0.4	0.2	0.8	1.2	1.6	2
	0.80~ 0.99	0.6	0.3	1	1.5	2	2.5
	1.00~ 1.29	0.8	0.4	1.2	1.8	2.4	3.0
	1.30~ 1.49	1.0	0.5	1.4	2.1	2.9	3.7
	1.50~ 1.99	1.2	0.6	1.6	2.4	3.3	4.2
	2.00~ 2.49	1.5	0.8	2	3.2	4.4	5.6
	2.50~ 3.49	2.0	1.0	2.6	4.2	5.8	7
	3.50~ 4.49	3.0	1.5	3.9	5.9	8	9.7
	4.50~ 5.49	4.0	2.0	5.2	7.5	10.2	12.4
	5.50~10.30	5.0	2.5	6.2	9.0	12.2	14.9

Ejector pins	Finished products
Reversed reading (Concave character)	Normal character (Convex character)

Details of engraving



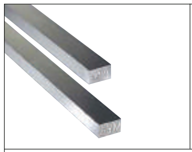
Width of engraving (a)	0.1×Q~0.2×Q
Angle of engraving (b°)	35° ±2°
Depth of engraving (e)	・When P≦0.99, 0.03±0.01 ・When P≧1.00, 0.05±0.02

High Speed Steel
SKH51 equivalent

With Engraving
$P\cdot W_{-0.005}^{0}$
Free designation

PRECISION RECTANGULAR EJECTOR PINS WITH ENGRAVING

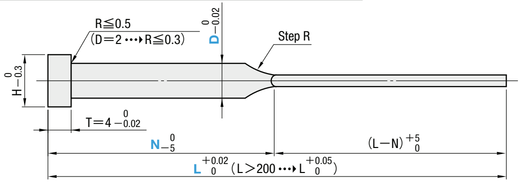
Non JIS material definition is listed on P.1351 - 1352

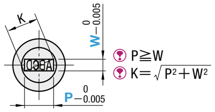


RoHS

Part Number	Head Thickness	T P・W
ERVF□M (Sequential numbering designation) **ERVF□MR**	4mm	$^{0}_{-0.005}$

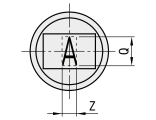
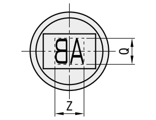
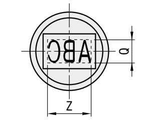
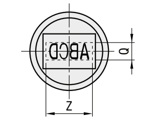
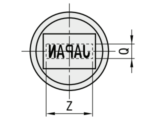
Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)





$P\geqq W$
$K=\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

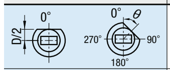
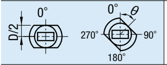
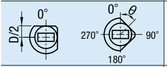
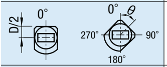
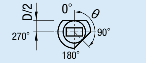
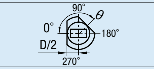
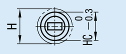
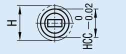
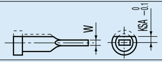
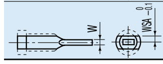
1M・1MR (1 character)	**2M・2MR** (2 characters)	**3M** (3 characters)	**4M** (4 characters)	**5M** (5 characters)
				
$0.80\leqq P\leqq 10.30$	$2.30\leqq P\leqq 10.30$	$3.10\leqq P\leqq 10.30$	$3.90\leqq P\leqq 10.30$	$5.00\leqq P\leqq 10.30$

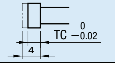
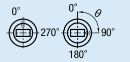
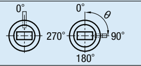
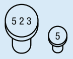
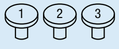
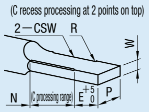
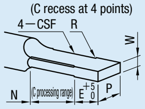
Alterations

Part Number — L — P — W — N — Characters for engraving (0~9,A~Z,／><+−⬚・.) — (AKC・AWC⋯etc.)
ERVF3M 5 — 120.25 — P3.50 — W1.5 — N60 — MY3 — AWC 60

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments $0\leqq AKC<360$ When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments $0\leqq AWC<360$ When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments $0\leqq ARC<360$ When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments $0\leqq ADC<360$ When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments $0<KGA<360$	
	KGD	KGD=1° increments $0<KGD<360$	
	HC	HC=0.1mm increments $D+1\leqq HC<H$	
	HCC	HCC=0.1mm increments $D+1\leqq HCC<H-0.3$	
	KSA	KSA=0.1mm increments $W/2+0.1\leqq KSA\leqq D/2-0.1$	
	WSA	WSA=0.1mm increments $W/2+0.1\leqq WSA\leqq D/2-0.1$	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments $2.0\leqq TC<4$ (Dimensions L and N remain unchanged) $4-TC\leqq Lmax.-L$	Quotation
	NC	Dowel hole boring NC=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1—E25 CSW, CSF: Range of designation (W 1.0≦W<1.5: CSW, CSF 0.3; W≧1.5: CSW, CSF 0.5, 1, 1.5)	
	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5—E30 $P\geqq 1.5$ CSW, CSF<W/2 E=1mm increments $5\leqq E\leqq (L-N)-20$	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

H	Part Number			0.01mm increments			Kmax.	N	Nmin.	Characters for engraving (Round Gothic type)
	Type	Character	D	L	P	W		1mm increments		
4	ERVF	1M 2M 3M 4M 5M Sequential numbering designation 1MR 2MR	2	40.00～250.00	0.80～ 1.70	0.30～	1.9	10≦(L−N)≦200	23	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
5			2.5		0.80～ 2.20		2.4		26	
6			3		1.00～ 2.70		2.9		27	
7			3.5		1.00～ 3.20		3.4			
			4		1.00～ 3.70		3.9		29	
8			4.5		1.20～ 4.20		4.4			
			5	50.00～250.00	1.50～ 4.80	0.40～	4.9		31	
9			5.5		1.80～ 5.30	0.50～	5.4			
			6		2.00～ 5.80		5.9		33	
10			6.5		2.00～ 6.30		6.4		40	
			7		2.30～ 6.80		6.9			
11			8		2.30～ 7.80		7.9			
14			8.5		2.30～ 8.30		8.4			
15			10		3.00～ 9.80		9.9			
17			10.5		3.00～10.30		10.4			

Name	Slash	Greater	Less
Characters for engraving	／	>	<
Order code	¥	>	<

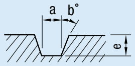
Name	Plus	Minus	Space
Characters for engraving	+	−	⬚
Order code	+	#	%

Name	Centered dot	Period
Characters for engraving	・	.
Order code	@	&

- Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ $P\geqq W$
- Use ¥ for indicating ／ (slash), # for − (minus), % for ⬚ (space), @ for ・ (centered dot), and & for . (period)
- 1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
- In case of 1MR,"0" is next to "9" while "A" is next to "Z".
- In case of 2MR, the ones digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the tens digit is increased by one.
- ⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.
- When placing the order for 5 pieces of ERVF1MR2—150—P1.5—W0.5—N70—1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of ERVF1MR3—150—P2.5—W1.2—N70—Z, characters for engraving "Z A B"
- When placing the order for 4 pieces of ERVF2MR4—100—P3.0—W2.0—N50—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of ERVF2MR4—100—P3.5—W2.2—N50—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of ERVF2MR6—150—P5.0—W2.6—N70—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

Ejector pins	Finished products
Reversed reading (Concave character)	Normal character (Convex character)

Details of engraving



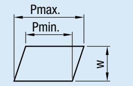
Width of engraving (a)	0.1×Q～0.2×Q
Angle of engraving (b°)	35° ±2°
Depth of engraving (e)	・When P≦0.99 0.03±0.01 ・When P≧1.00 0.05±0.02

■Relationship between Dimension (P) and Character Size (Q,Z)

P (Horizontal size)	W (Vertical size)	Q (Character Height)	Z(Character Width)				
			1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
P≧Z+0.2	0.30～ 0.39	0.2	0.1	0.6	0.9	1.2	1.5
	0.40～ 0.49	0.25	0.15	0.65	1	1.3	1.65
	0.50～ 0.59	0.35	0.2	0.75	1.15	1.5	1.9
	0.60～ 0.79	0.4	0.2	0.8	1.2	1.6	2
	0.80～ 0.99	0.6	0.3	1	1.5	2	2.5
	1.00～ 1.29	0.8	0.4	1.2	1.8	2.4	3.0
	1.30～ 1.49	1.0	0.5	1.4	2.1	2.9	3.7
	1.50～ 1.99	1.2	0.6	1.6	2.4	3.3	4.2
	2.00～ 2.49	1.5	0.8	2	3.2	4.4	5.6
	2.50～ 3.49	2.0	1.0	2.6	4.2	5.8	7
	3.50～ 4.49	3.0	1.5	3.9	5.9	8	9.7
	4.50～ 5.49	4.0	2.0	5.2	7.5	10.2	12.4
	5.50～10.30	5.0	2.5	6.2	9.0	12.2	14.9

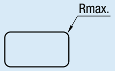
■Precision Standard

Squareness of the tip corner



W plane as the base
(Pmax.−Pmin.)≦0.01

Corner R value of the tip corner



Rmax.≦0.03 (Trimming R)
The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

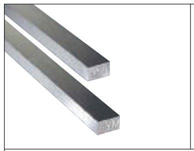
Order

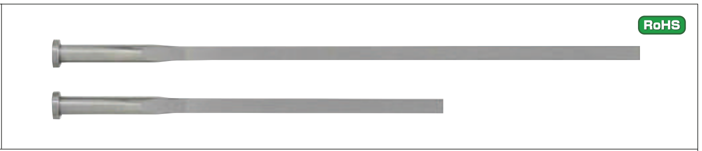
Part Number (Type Character D) — L — P — W — N — Characters for engraving (0～9, A～Z ／><+−⬚・.)
ERVF 3M 5 — 120.25 — P3.50 — W1.5 — N60 — MY3

Days to Ship Quotation

Price Quotation

PRECISION R-CHAMFERED RECTANGULAR EJECTOR PINS WITH ENGRAVING



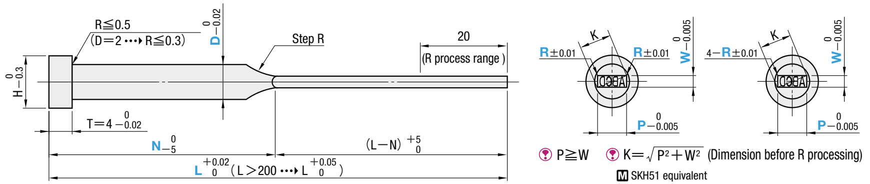


RoHS

Part Number		Head Thickness	T P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERVWR□M ERVWR□MR	ERVFR□M ERVFR□MR	4mm	$^{0}_{-0.005}$

(2 places on the upper side are rounded.)
ERVWR□M
ERVWR□MR

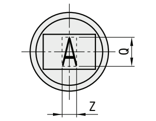
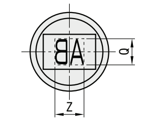
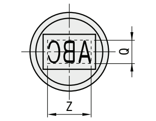
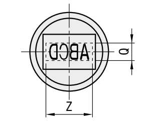
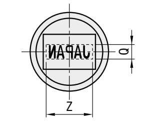
(4 places are rounded.)
ERVFR□M
ERVFR□MR



P≧W K= $\sqrt{P^2+W^2}$ (Dimension before R processing)

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)

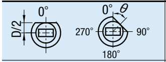
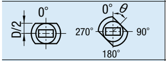
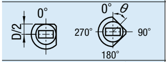
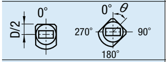
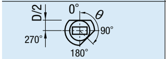
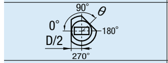
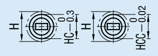
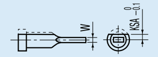
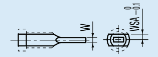
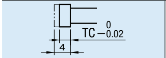
M SKH51 equivalent
H 58~60HRC
Range of guaranteed base material hardness (Details P.1303)

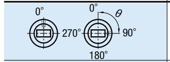
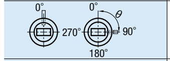
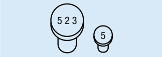
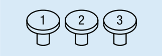
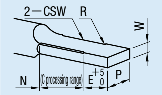
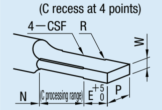
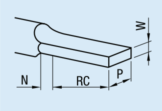
1M・1MR (1 character)	2M・2MR (2 characters)	3M (3 characters)	4M (4 characters)	5M (5 characters)
				
0.80≦P≦10.30	2.30≦P≦10.30	3.10≦P≦10.30	3.90≦P≦10.30	5.00≦P≦10.30

Alterations

Part Number — L — P — W — R — N — Characters for engraving (0~9,A~Z,/><+−⬚・.) — (AKC・AWC···etc.)
ERVFR3M 5 — 120.25 — P3.50 — W1.50 — R0.1 — N60 — MY3 — AWC 60

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	Quotation
	KGD	KGD=1° increments 0<KGD<360	
	HC HCC	HC(HCC)=0.1mm increments ・HC ···› Head diameter tolerance $^{0}_{-0.3}$ ・HCC ···› Head diameter tolerance $^{0}_{-0.02}$ D+1≦HC<H,D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments 2.0≦TC<4 (Dimensions L and N remain unchanged) 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	NC	Dowel hole boring NC=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	Quotation
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	
	RC	Designate the length of R processed part. 5≦RC≦(L−N)−30 and RC≦40 RC=1mm increments Designation method RC25 Adds RC recess processing at all places R processed	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

P≧1.5
CSW, CSF<W/2
E=1mm increments
5≦E≦(L−N)−20
R process range P.196

Non JIS material definition is listed on P.1351 - 1352

H	Part Number			0.01mm increments			R	Kmax.	N	Nmin.	Characters for engraving (Round Gothic type)
	Type	Character	D	L	P	W			1mm increments		
4	ERVWR (2 places on the upper side are rounded.) ERVFR (4 places are rounded.)	1M 2M 3M 4M 5M (Sequential numbering designation) 1MR 2MR	2	50.00~250.00	0.80~1.80	0.30~	0.1 0.15 0.2 0.3	1.9	20≦(L−N)≦200	23	0 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z (others)
5			2.5		0.80~2.30			2.4		26	
6			3		1.00~2.80			2.9		27	
7			3.5		1.00~3.30			3.4			
			4		1.00~3.80			3.9		29	
8			4.5		1.20~4.30			4.4			
			5		1.50~4.80	0.40~		4.9		31	
9			5.5		1.80~5.30			5.4			
			6		2.00~5.80	0.50~	R≦ $\frac{W}{2}$ −0.05	5.9		33	
10			6.5		2.00~6.30			6.4		40	
			7		2.30~6.80			6.9			
11			8		2.30~7.80			7.9			
15			10		3.00~9.80			9.9			

Name	Slash	Greater	Less
Characters for engraving	／	>	<
Order code	¥	>	<

Name	Plus	Minus	Space
Characters for engraving	+	−	⬚
Order code	+	#	%

Name	Centered dot	Period
Characters for engraving	・	.
Order code	@	&

Use ¥ for indicating ／ (slash), # for − (minus), % for ⬚ (space), @ for ・ (centered dot), and & for . (period)
1MR and 2MR are sequential numbering designation. In the case of bulk order of two or more ejector pins with the same size, the sequential numbering engraving is performed.
In case of 1MR,"0" is next to "9" while "A" is next to "Z".
In case of 2MR, the ones digit is sequential, and if next to "9" or "Z", it starts from "0" or "A" while the tens digit is increased by one.
⊗ In case of 1MR and 2MR, other engraving characters cannot be used for designation.

- When placing the order for 5 pieces of ERVWR1MR2—150—P1.5—W0.5—R0.1—N70—1, characters for engraving "1 2 3 4 5"
- When placing the order for 3 pieces of ERVWR1MR3—150—P2.5—W1.2—R0.1—N70—Z, characters for engraving "Z A B"
- When placing the order for 4 pieces of ERVWR2MR4—100—P3.0—W2.0—R0.1—N50—01, characters for engraving "01 02 03 04"
- When placing the order for 4 pieces of ERVWR2MR4—100—P3.5—W2.2—R0.1—N50—A8, characters for engraving "A8 A9 B0 B1"
- When placing the order for 6 pieces of ERVWR2MR6—150—P5.0—W2.6—R0.1—N70—1X, characters for engraving "1X 1Y 1Z 2A 2B 2C"

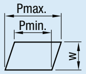
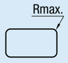
Order

Part Number (Type Character D) — L — P — W — R — N — Characters for engraving (0~9, A~Z /><+−⬚・.)
ERVFR 3M 5 — 120.25 — P3.50 — W1.50 — R0.1 — N60 — MY3

Days to Ship Quotation

Price Quotation

Precision Standard

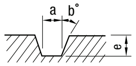
Squareness of the tip corner		W plane as the base (Pmax.−Pmin.)≦0.01
Corner R value of the tip corner		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

■Relationship between Dimension (P)・(W) and Character Size (Q)・(Z)

P (Horizontal size)	W (Vertical size)	Q (Character Height)	Z(Character Width)				
			1M・1MR	2M・2MR	3M	4M	5M
P≧Z+0.2	0.30~0.39	0.2	0.1	0.6	0.9	1.2	1.5
	0.40~0.49	0.25	0.15	0.65	1	1.3	1.65
	0.50~0.59	0.35	0.18	0.76	1.14	1.52	1.9
	0.60~0.79	0.4	0.2	0.8	1.2	1.6	2
	0.80~0.99	0.6	0.3	1	1.5	2	2.5
	1.00~1.29	0.8	0.4	1.2	1.8	2.4	3.0
	1.30~1.49	1.0	0.5	1.4	2.1	2.9	3.7
	1.50~1.99	1.2	0.6	1.6	2.4	3.3	4.2
	2.00~2.49	1.5	0.8	2	3.2	4.4	5.6
	2.50~3.49	2.0	1.0	2.6	4.2	5.8	7
	3.50~4.49	3.0	1.5	3.9	5.9	8	9.7
	4.50~5.49	4.0	2.0	5.2	7.5	10.2	12.4
	5.50~10.30	5.0	2.5	6.2	9.0	12.2	14.9

Ejector pins	Finished products
Reversed reading (Concave character)	Normal character (Convex character)

Details of engraving



Width of engraving (a)	0.1×Q~0.2×Q
Angle of engraving (b°)	35° ±2°
Depth of engraving (e)	・When P≦0.99, 0.03±0.01 ・When P≧1.00, 0.05±0.02

High Speed Steel
SKH51 equivalent

For Large Size
P・W$_{-0.02}^{0}$
Standard・L dimension designation

RECTANGULAR EJECTOR PINS FOR LARGE MOLD

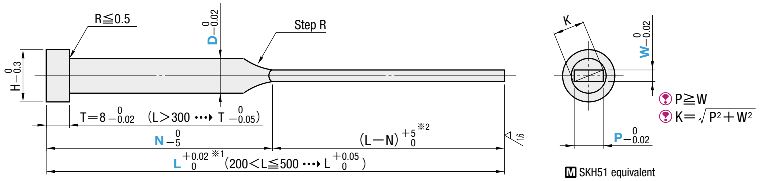
—STANDARD・L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	Head Thickness	T P・W
ERJXB (Standard) **ERJXL** (L dimension designation type)	8mm	$_{-0.02}^{0}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
$K=\sqrt{P^2+W^2}$

※1 ERJXB is $_{+0.1}^{+5}$.
※2 ERJXB is $_{0}^{+10}$.

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

Part Number	—	L	—	P	—	W	—	N
ERJXL 15	—	205.00	—	P10.0	—	W5.0	—	N 120

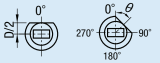
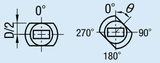
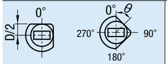
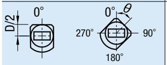
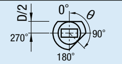
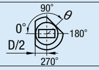
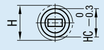
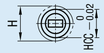
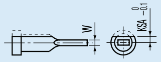
Days to Ship Quotation

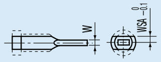
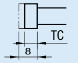
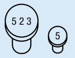
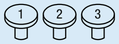
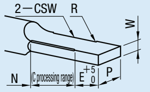
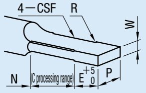
Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC···etc.)
ERJXL 15	—	205.00	—	P10.0	—	W5.0	—	N120	—	AKC 0

Quotation

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments 4.0≦TC<8 Dimensions L and N become shorter by (8−TC). (ERJXB) Dimensions N becomes shorter by (8−TC). (ERJXL) (Dimension L remains unchanged.) 8−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	Quotation
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

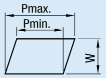
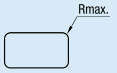
CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20
Available for ERJXL only

H	T	Part Number Type	D	L ERJXB	L ERJXL 0.01mm increments	P	W	N
15	8	**ERJXB** (Standard) **ERJXL** (L dimension designation type)	10	200	100.00～200.00	7.0 8.0	1.0 2.0 3.0 4.0 5.0	80 100
				300	200.01～300.00			100 120 150
				400	300.01～400.00			130 150 160
17			12	200	100.00～200.00	10.0	2.0 3.0 4.0 5.0 6.0	80 100
				300	200.01～300.00			100 120 150
				400	300.01～400.00			130 160 180
18			13	200	100.00～200.00	10.0	3.0 4.0 5.0 6.0 7.0	80 100
				300	200.01～300.00			120 130
				400	300.01～400.00			150 160 180
20			15	300	200.00～300.00	10.0 12.0	4.0 5.0 6.0 7.0 8.0	100 120
				400	300.01～400.00			160 180
				500	400.01～500.00			230
21			16	300	200.00～300.00	14.0	4.0 5.0 6.0	100 120
				400	300.01～400.00			130 180 230
				500	400.01～500.00			230 260 300
25			20	300	200.00～300.00	16.0 17.0	7.0 8.0 10.0	100 120
				400	300.01～400.00			130 160 230 260
				500	400.01～500.00			230 260 300

L−N≧10 (ERJXL)

■Precision Standard

Squareness of the tip corner	Corner R value of the tip corner
 W plane as the base (Pmax.−Pmin.)≦0.02	 Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

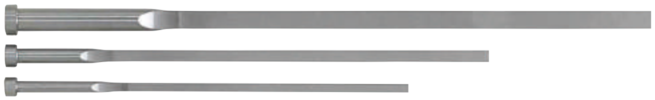
P Price Quotation

High Speed Steel
SKH51 equivalent

For Large Size
P・W$^{0}_{-0.02}$
Free designation

RECTANGULAR EJECTOR PINS FOR LARGE MOLD

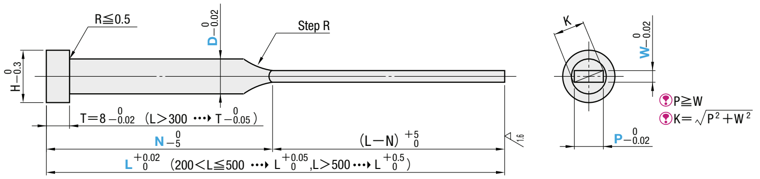
—FREE DESIGNATION TYPE—



RoHS

Part Number	Head Thickness	T P・W
ERJX	8mm	$^{0}_{-0.02}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)


R≦0.5
$D^{0}_{-0.02}$
Step R
$H^{0}_{-0.3}$
$T=8^{0}_{-0.02}$ (L>300 ···▸ $T^{0}_{-0.05}$)
N^{0}_{-5}
$(L-N)^{+5}_{0}$
$L^{+0.02}_{0}$ (200<L≦500 ···▸ $L^{+0.05}_{0}$, L>500 ···▸ $L^{+0.5}_{0}$)
1.6
K
$W^{0}_{-0.02}$
$P^{0}_{-0.02}$

P≧W
K=$\sqrt{P^2+W^2}$

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Order

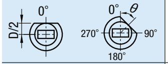
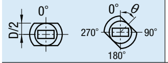
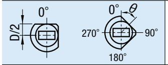
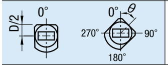
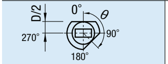
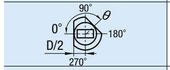
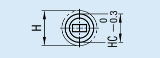
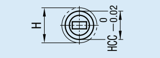
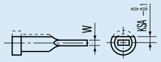
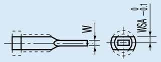
Part Number	—	L	—	P	—	W	—	N
ERJX 15	—	505.00	—	P10.00	—	W5.00	—	N170

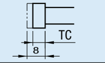
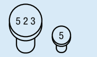
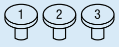
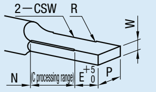
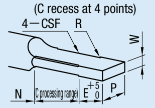
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC···etc.)
ERJX 15	—	505.00	—	P10.00	—	W5.00	—	N170	—	AKC 0

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	Quotation
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 4.0≦TC<8 (Dimensions L and N remain unchanged) 8−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	Quotation
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

CSW, CSF<W/2

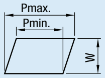
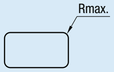
E=1mm increments
5≦E≦(L−N)−20

Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number		0.01mm increments			K max.	N 1mm increments
		Type	D	L	P	W		
15	8	ERJX	10	100.00～500.00	5.00～ 9.80	1.00～	9.9	・D10～16 N≧50 ・D20 N≧55 and N≧L/3 (L−N)≧10
17			12	100.00～600.00	6.00～11.80	1.00～	11.9	
18			13		6.00～12.80	1.00～	12.9	
20			15		8.00～14.80	1.50～	14.9	
21			16		8.00～15.80	1.50～	15.9	
25			20		10.00～19.80	1.50～	19.9	

Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ P≧W

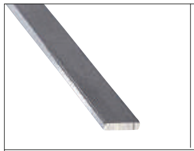
■Precision Standard

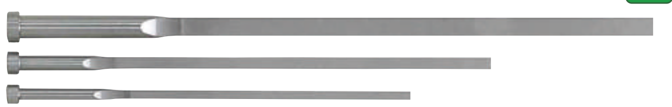
Squareness of the tip corner	Corner R value of the tip corner
 W plane as the base (Pmax.−Pmin.)≦0.02	 Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

Price Quotation

R-CHAMFERED RECTANGULAR EJECTOR PINS FOR LARGE MOLD

—FREE DESIGNATION TYPE—

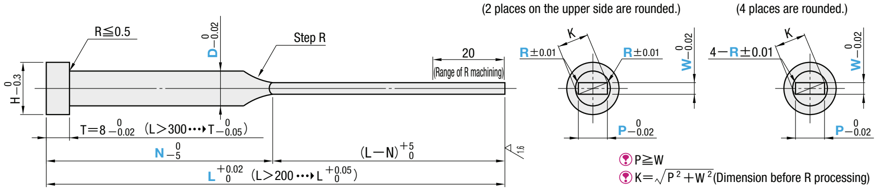




RoHS

Part Number		Head Thickness	T P • W
2 places on the upper side are rounded.	4 places are rounded.		
ERJXWR	**ERJXFR**	8mm	$^{0}_{-0.02}$

Range of guaranteed shaft diameter precision (D) (Details **P.1301**)
Step R (Details **P.1302**)



P≧W
K=$\sqrt{P^2+W^2}$(Dimension before R processing)

M SKH51 equivalent
H 58〜60HRC
Range of guaranteed base material hardness (Details **P.1303**)

Order

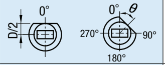
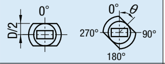
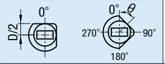
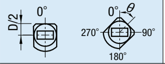
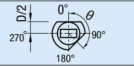
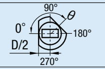
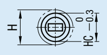
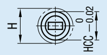
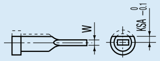
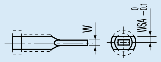
Part Number	—	L	—	P	—	W	—	R	—	N
ERJXWR 15	—	420.00	—	P10.00	—	W5.00	—	R0.15	—	N170

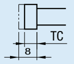
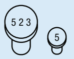
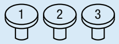
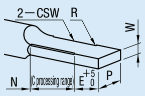
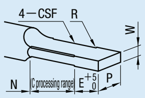
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	W	—	R	—	N	—	(AKC • AWC···etc.)
ERJXWR 15	—	420.00	—	P10.00	—	W5.00	—	R0.15	—	N170	—	AKC 0

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	KSA	KSA=0.1mm increments W/2+0.1≦KSA≦D/2−0.1	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

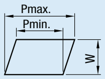
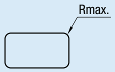
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 4.0≦TC<8 (Dimensions L and N remain unchanged) 8−TC≦Lmax.−L	Quotation
	NHC	Numbering on the head How to order **P.196**	
	NHN	Automatic sequential numbering on the head How to order **P.196**	
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25 CSW, CSF: Range of designation: W 1.0≦W<1.5 → CSW, CSF 0.3; W≧1.5 → 0.5, 1, 1.5 CSW, CSF<W/2	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30 E=1mm increments 5≦E≦(L−N)−20 R process range **P.196**	

Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number		0.01mm increments			R	K	N
		Type	D	L	P	W		max.	1mm increments
15	8	**ERJXWR** (2 places on the upper side are rounded.) **ERJXFR** (4 places are rounded.)	10	100.00〜450.00	5.00〜 9.80	1.00〜	0.1 0.15 0.2 0.3 0.5 0.7 R≦$\frac{W}{2}$−0.05	9.9	• D10〜16 N≧50 • D20 N≧55 and N≧L/3 (L−N)≧10
17			12		6.00〜11.80	1.00〜		11.9	
18			13		6.00〜12.80	1.00〜		12.9	
20			15		8.00〜14.80	1.50〜		14.9	
21			16		8.00〜15.80	1.50〜		15.9	
25			20		10.00〜19.80	1.50〜		19.9	

Designate P • W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ (Dimension before R processing) P≧W

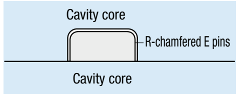
■Precision Standard

Squareness of the tip corner		Corner R value of the tip corner	
	W plane as the base (Pmax.−Pmin.)≦0.02		Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P • W dimensions. (Details **P.1313**)

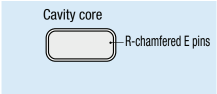
Price Quotation

Example

①Separable Piece



②Cavity core in wire hole.



Dies Steel
SKD61 equivalent
+
Nitrided

For Large Size
P・W$_{-0.02}^{0}$
Standard・L dimension designation

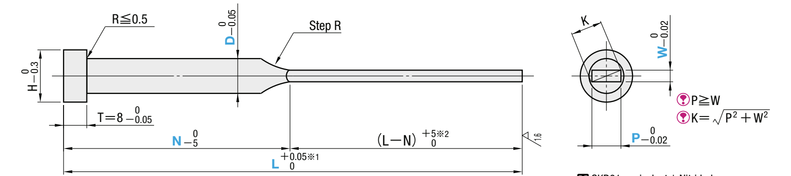
RECTANGULAR EJECTOR PINS FOR LARGE MOLD

— STANDARD・L DIMENSION DESIGNATION TYPE —

RoHS

Part Number	Head Thickness	T P・W
ERNXB (Standard) **ERNXL** (L dimension designation type)	8mm	$^{0}_{-0.02}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R (Details P.1302)



P≧W
$K=\sqrt{P^2+W^2}$

※1 ERNXB is $^{+5}_{+0.1}$.
※2 ERNXB is $^{+10}_{0}$.

This product is not polished after nitriding.
There is hardly any color unevenness, and no problem with the quality.

M SKD61 equivalent+Nitrided
H Surface 900HV～ Base material40～45HRC
Range of guaranteed surface hardness for nitriding (Details Right page)

Order

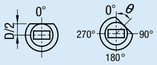
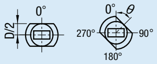
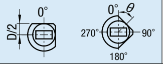
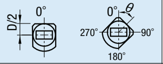
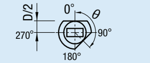
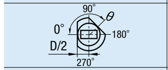
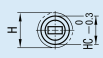
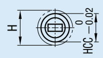
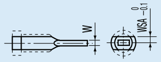
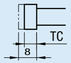
Part Number	—	L	—	P	—	W	—	N
ERNXL13	—	205.00	—	P10.0	—	W5.0	—	N120

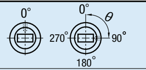
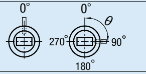
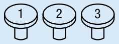
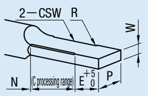
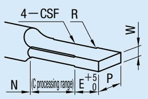
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC…etc.)
ERNXL13	—	205.00	—	P10.0	—	W5.0	—	N120	—	AKC 0

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	Quotation
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	
	TC	TC=0.1mm increments 4.0≦TC<8 Dimensions L and N become shorter by (8−TC). (ERNXB) Dimensions N becomes shorter by (8−TC). (ERNXL) (Dimension L remains unchanged.) 8−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	NC	Dowel hole boring NC=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Combination with other than NHC・NHN not available. How to order and detailed specifications P.195	
	NHC	Numbering on the head How to order P.196	
	NHN	Automatic sequential numbering on the head How to order P.196	Quotation
(C recess processing at 2 points on top) 	CSW	C chamfering processing at 2 points on top (except tip) for relief is performed. Designation method CSW1−E25	
(C recess at 4 points) 	CSF	C chamfering processing at 4 points (except tip) for relief is performed. Designation method CSF0.5−E30	

CSW, CSF: Range of designation

W	CSW, CSF
1.0≦W<1.5	0.3
W≧1.5	0.5 1 1.5

CSW, CSF<W/2

E=1mm increments
5≦E≦(L−N)−20

Available for ERNXL only

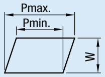
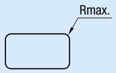
Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number Type	D	L	P	W	N
15	8	**ERNXB** (Standard)	10	200	7.0 8.0	2.0 3.0 4.0 5.0	80 100
				300			100 120 150
				400			130 150 160
17			12	200	10.0	2.0 3.0 4.0 5.0 6.0	80 100
				300			100 120 150
				400			130 160 180
18			13	200	10.0	3.0 4.0 5.0 6.0 7.0	80 100
				300			120 130
				400			150 160 180
20			15	300	10.0 12.0	4.0 5.0 6.0 7.0 8.0	100 120
				400			160 180
				500			230
21			16	300	14.0	4.0 5.0 6.0	100 120
				400			130 180 230
				500			230 260 300
25			20	300	16.0 17.0	7.0 8.0 10.0	100 120
				400			130 160 230 260
				500			230 260 300

H	T	Part Number Type	D	L 0.01mm increments	P	W	N
15	8	**ERNXL** (L dimension designation type)	10	200.00～300.00	7.0 8.0	2.0 3.0 4.0 5.0	100 120 150
				300.01～400.00			130 150 160
17			12	200.00～300.00	10.0	2.0 3.0 4.0 5.0 6.0	100 120 150
				300.01～400.00			130 160 180
18			13	200.00～300.00	10.0	3.0 4.0 5.0 6.0 7.0	120 130
				300.01～400.00			150 160 180
20			15	200.00～300.00	10.0 12.0	4.0 5.0 6.0 7.0 8.0	100 120
				300.01～400.00			160 180
				400.01～500.00			230
21			16	200.00～300.00	14.0	4.0 5.0 6.0	100 120
				300.01～400.00			130 180 230
				400.01～500.00			230 260 300
25			20	200.00～300.00	16.0 17.0	7.0 8.0 10.0	100 120
				300.01～400.00			130 160 230 260
				400.01～500.00			230 260 300

L−N≧10

■ Precision Standard

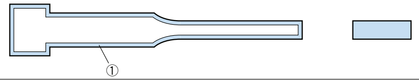
Squareness of the tip corner	Corner R value of the tip corner
 W plane as the base (Pmax.−Pmin.)≦0.02	 Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (Details P.1313)

Price Quotation

■ Guaranteed Ranges of Nitriding and Surface Hardness

RECTANGULAR EJECTOR PINS FOR LARGE MOLD

※ Cross-sectional view



M	Ejector Pin Surface Hardness ①(Guaranteed range of nitrided surface hardness)
SKD61 equivalent + Nitrided	900HV～

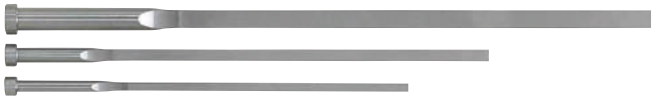
Dies Steel
SKD61 equivalent
+
Nitrided

For Large Size
P・W $^{0}_{-0.02}$
Free designation

RECTANGULAR EJECTOR PINS FOR LARGE MOLD

— FREE DESIGNATION TYPE —

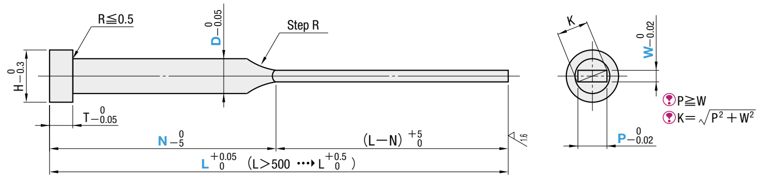
Non JIS material definition is listed on P.1351 - 1352



RoHS

Part Number	Head Thickness	**T** P・W
ERNX	6・8mm(JIS)	$^{0}_{-0.02}$

Range of guaranteed shaft diameter precision (D) (**Details P.1301**)
Step R (**Details P.1302**)



P≧W
$K=\sqrt{P^2+W^2}$

M SKD61 equivalent+Nitrided
H Surface 900HV~ Base material 40~45HRC
Range of guaranteed of nitrided surface hardness
(**Details P.1303**)

This product is not polished after nitriding.
There is hardly any color unevenness, and no problem with the quality.

Order

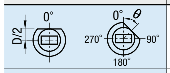
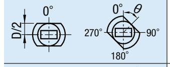
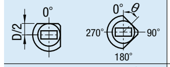
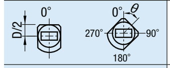
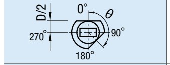
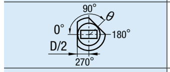
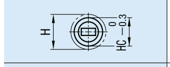
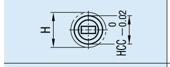
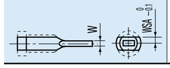
Part Number	—	L	—	P	—	W	—	N
ERNX15	—	505.00	—	P10.00	—	W5.00	—	N170

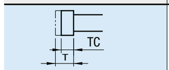
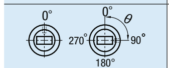
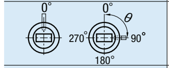
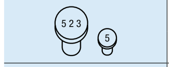
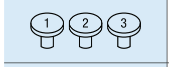
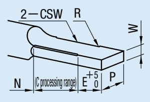
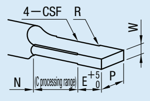
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC⋯etc.)
ERNX15	—	505.00	—	P10.00	—	W5.00	—	N170	—	AKC 0

Alteration details P.195

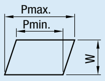
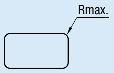
Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	**AWC**	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	**ARC**	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	**ADC**	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC**	HC=0.1mm increments D+1≦HC<H	
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3	
	**WSA**	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments 4.0≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	Quotation
	**NC**	Dowel hole boring NC=90° increments ⊗ Combination with other than NHC・NHN not available. ※How to order and detailed specifications P.195	
	**NCW**	Dowel hole boring+Spring pin driving NCW=90° increments ⊗ Combination with other than NHC・NHN not available. ※How to order and detailed specifications P.195	
	**NHC**	Numbering on the head ※How to order and detailed specifications P.196	
	**NHN**	Automatic sequential numbering on the head ※How to order and detailed specifications P.196	
(C recess processing at 2 points on top) 	**CSW**	C-chamfering processing at 2 corners of the blade (except tip) for relief. Designation method CSW1−E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 — CSW,CSF: 0.3 W: W≧1.5 — CSW,CSF: 0.5, 1, 1.5 CSW,CSF<W/2 E=1mm increments 5≦E≦(L−N)−20	
(C recess at 4 points) 	**CSF**	C-chamfering processing at 4 corners of the blade (except tip) for relief. Designation method CSF0.5−E30	

H	T	Part Number		0.01mm increments			K	N
		Type	D	L	P	W	max.	1mm increments
8	6	ERNX	4	200.00~350.00	2.00~ 3.70	1.00~	3.9	N≧40 and (L−N)≦200
9			5		2.50~ 4.70	1.00~	4.9	
10			6	200.00~500.00	3.00~ 5.50	2.00~	5.9	・D6~8 N≧45 ・D10~16 N≧50 ・D20・25 N≧55 and N≧L/3 350≧(L−N)≧10
11			7		3.30~ 6.60	2.00~	6.9	
13	8		8		3.30~ 7.60	2.00~	7.9	
15			10		5.00~ 9.60	2.00~	9.9	
17			12	200.00~500.00	6.00~11.70	2.00~	11.9	
18			13		6.00~12.70	2.00~	12.9	
20			15		8.00~14.70	2.00~	14.9	
21			16	200.00~500.00	8.00~15.70	2.00~	15.9	
25			20		10.00~19.70	2.00~	19.9	
30			25		13.00~24.70	2.50~	24.9	

Designate P・W dimensions within the Kmax. $K=\sqrt{P^2+W^2}$ P≧W

Precision Standard

Squareness of the tip corner	Corner R value of the tip corner
 W plane as the base (Pmax.−Pmin.)≦0.02	 Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P・W dimensions. (**Details P.1313**)

Price Quotation

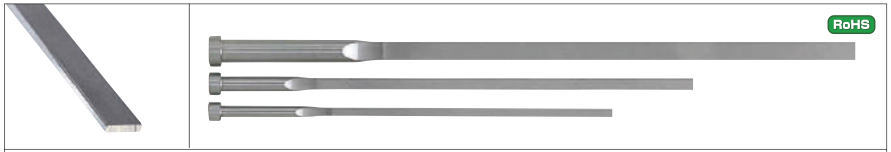
Dies Steel
SKD61 equivalent
+
Nitrided

R-chamfered
For Large Size
P・W$_{-0.02}^{\ 0}$
Free designation

R-CHAMFERED RECTANGULAR EJECTOR PINS FOR LARGE MOLD

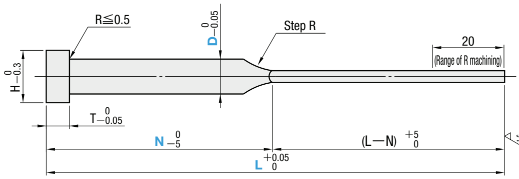
—FREE DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

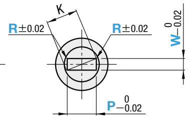


Part Number		Head Thickness	T P・W
2 places on the upper side are rounded.	4 places are rounded.		
ERNXWR	**ERNXFR**	6・8mm(JIS)	$^{\ 0}_{-0.02}$

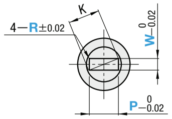
Range of guaranteed shaft diameter precision (D) (**Details P.1301**)
Step R (**Details P.1302**)



ERNXWR
(2 places on the upper side are rounded.)



ERNXFR
(4 places are rounded.)



P≧W
K=$\sqrt{P^2+W^2}$(Dimension before R processing)

R tolerance has been changed to ±0.02.
This product is not polished after nitriding.
There is hardly any color unevenness, and no problem with the quality.

M SKD61 equivalent+Nitrided
H Surface 900HV~ Base material 40~45HRC
Range of guaranteed base material hardness
(**Details P.1303**)

Order

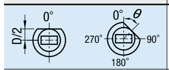
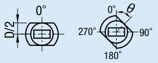
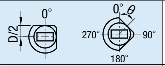
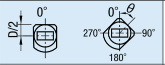
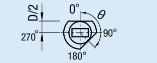
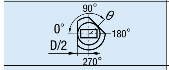
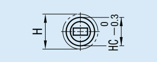
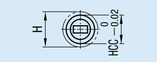
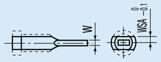
Part Number	—	L	—	P	—	W	—	R	—	N
ERNXWR13	—	420.00	—	P10.00	—	W5.00	—	R0.15	—	N170

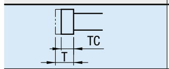
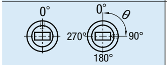
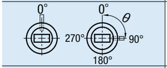
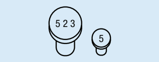
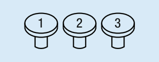
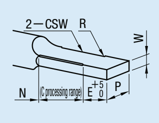
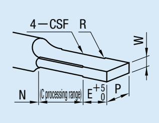
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	W	—	R	—	N	—	(AKC・AWC…etc.)
ERNXWR13	—	420.00	—	P10.00	—	W5.00	—	R0.15	—	N170	—	AKC 0

Alteration details P.195

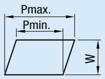
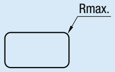
Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360 When combined with KSA/WSA, 90° increments only.	Quotation
	AWC	AWC=1° increments 0≦AWC<360 When combined with KSA/WSA, 90° increments only.	
	ARC	ARC=1° increments 0≦ARC<360 When combined with KSA/WSA, 90° increments only.	
	ADC	ADC=1° increments 0≦ADC<360 When combined with KSA/WSA, 90° increments only.	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	WSA	WSA=0.1mm increments W/2+0.1≦WSA≦D/2−0.1	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 4.0≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	Quotation
	NC	Dowel hole boring NC=90° increments Combination with other than NHC・NHN not available. ※How to order and detailed specifications P.195	
	NCW	Dowel hole boring+Spring pin driving NCW=90° increments Combination with other than NHC・NHN not available. ※How to order and detailed specifications P.195	
	NHC	Numbering on the head ※How to order and detailed specifications P.196	
	NHN	Automatic sequential numbering on the head ※How to order and detailed specifications P.196	
(C recess processing at 2 points on top) 	CSW	C-chamfering processing at 2 corners of the blade (except tip) for relief. Designation method CSW1−E25 CSW, CSF: Range of designation W: 1.0≦W<1.5 — CSW,CSF: 0.3 W: W≧1.5 — CSW,CSF: 0.5, 1, 1.5 CSW,CSF<W/2 E=1mm increments 5≦E≦(L−N)−20 R process range P.196	
(C recess at 4 points) 	CSF	C-chamfering processing at 4 corners of the blade (except tip) for relief. Designation method CSF0.5−E30	

H	T	Part Number		0.01mm increments			R	K max.	N
		Type	D	L	P	W			1mm increments
8	6	**ERNXWR** (2 places on the upper side are rounded.) **ERNXFR** (4 places are rounded.)	4	200.00~350.00	2.00~ 3.70	1.00~	0.1 0.15 0.2 0.3 0.5 0.7 R≦$\frac{W}{2}$−0.05	3.9	N≧40 and (L−N)≦200
9			5		2.50~ 4.70	1.00~		4.9	
10			6	200.00~450.00	3.00~ 5.50	2.00~		5.9	・D6~8 N≧45 ・D10~16 N≧50 ・D20 N≧55 and N≧L／3 350≧(L−N)≧10
11			7		3.30~ 6.60	2.00~		6.9	
13	8		8		3.30~ 7.60	2.00~		7.9	
15			10		5.00~ 9.60	2.00~		9.9	
17			12		6.00~11.70	2.00~		11.9	
18			13		6.00~12.70	2.00~		12.9	
20			15		8.00~14.70	2.00~		14.9	
21			16		8.00~15.70	2.00~		15.9	
25			20		10.00~19.70	2.00~		19.9	

Designate P・W dimensions within the Kmax. K=$\sqrt{P^2+W^2}$ (Dimension before R processing) P≧W

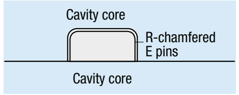
Precision Standard

Squareness of the tip corner	Corner R value of the tip corner
 W plane as the base (Pmax.−Pmin.)≦0.02	 Rmax.≦0.03 (Trimming R) Corner R value outside R processing range The tip corners have been slightly trimmed to measure the P・W dimensions. (**Details P.1313**)

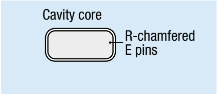
Price Quotation

Example

① Separable Piece



② Cavity core in wire hole.



High Speed Steel
SKH51 equivalent

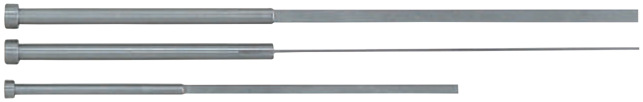
For Large Size
Caulking type
$P \cdot W^{0}_{-0.02}$

RECTANGULAR EJECTOR PINS FOR LARGE MOLD

—CAULKING・STANDARD／CAULKING・L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

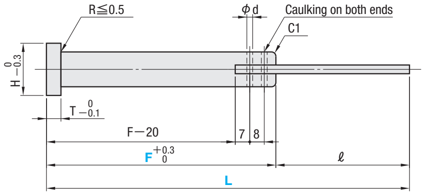
RoHS

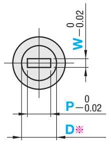


Part Number	Head Thickness	L	P・W
ERHK−B (Standard)	6・8mm (JIS)	$^{+5}_{+0.1}$	$^{0}_{-0.02}$
ERHK−L (L dimension designation type)		$^{+0.1}_{0}$ (L≧630.1 ···› L $^{+0.5}_{0}$)	

(※)ℓmax.

P	W	ℓ max.
6～ 8	1.0～2.0	280
10～15	1.0・1.2	
	1.5～6.0	380





※

D	Tolerance
6～12	$^{-0.01}_{-0.02}$
16	$^{-0.01}_{-0.03}$

Range of guaranteed shaft diameter precision (D) (Details P.1301)

M SKH51 equivalent (Flat bar)
SK4 (Shaft)
H 58～60HRC (Flat bar)
SK4 is not annealed.

The flat bar is inserted into the shank and caulked; though grinding is performed to eliminate any trace of caulking.

Order

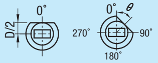
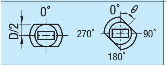
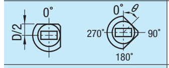
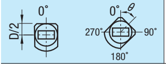
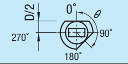
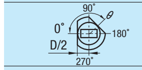
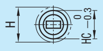
Part Number	—	L	—	P	—	W	—	F
ERHK−B12	—	300	—	P12	—	W1.2	—	F160

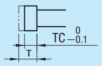
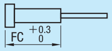
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	W	—	F(FC)	—	(AKC・AWC···etc.)
ERHK−L12	—	300.0	—	P12	—	W1.2	—	FC165	—	AKC60

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC<360	Quotation
	AWC	AWC=1° increments 0≦AWC<360	
	ARC	ARC=1° increments 0≦ARC<360	
	ADC	ADC=1° increments 0≦ADC<360	
	KGA	KGA=1° increments 0<KGA<360	
	KGD	KGD=1° increments 0<KGD<360	
	HC	HC=0.1mm increments D+1≦HC<H	

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T T−TC≦Lmax.−L ERHK−B ···›Dimensions L and F become shorter by (T−TC). ERHK−L ···›Dimension L remains unchanged. Dimensions F become shorter by (T−TC). (Dimension F remains unchanged when FC code is combined.)	Quotation
	FC	FC=1mm increments 40<FC<Fmax. ⊗ Not available for ERHK−B.	

■Standard　ERHK−B

H	T	d	Part Number		L	P	W	F
			Type	D	10mm increments	Selection	Selection	10mm increments
10	6	2	ERHK−B	6	80～680	6	1.0 1.2 1.5 1.8 2.0 4.0 (D12・16 only) 6.0 (D12・16 only)	※60～400
11		3		7				
13	8			8		6　7　8		
15		4		10	80～780	8　10		
17				12	80～880	10　12		※60～500
21				16		10　12　15		

※ℓmax. before designating. (Left page)

■L dimension designation type　ERHK−L

H	T	d	Part Number		L	P	W	F
			Type	D	0.1mm increments	Selection	Selection	10mm increments
10	6	2	ERHK−L	6	80.0～680.0	6	1.0 1.2 1.5 1.8 2.0 4.0 (D12・16 only) 6.0 (D12・16 only)	※60～400
11		3		7				
13	8			8		6　7　8		
15		4		10	80.0～780.0	8　10		
17				12	80.0～880.0	10　12		※60～500
21				16		10　12　15		

※ℓmax. before designating. (Left page)

P Price　Quotation

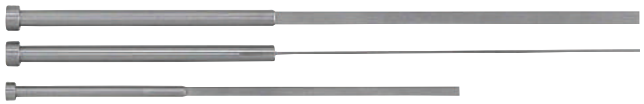
High Speed Steel
SKH51 equivalent

For Large Size
Caulking type
P・W$_{-0.02}^{0}$

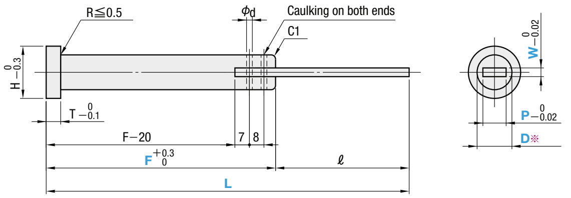
RECTANGULAR EJECTOR PINS FOR LARGE MOLD

— CAULKING・FREE DESIGNATION TYPE —

RoHS



Part Number	Head Thickness	T L	T P・W
ERHK−F (Free designation type)	6・8mm (JIS)	$^{+0.1}_{0}$ (L≧630.1···› L$^{+0.5}_{0}$)	$^{0}_{-0.02}$



(※)ℓmax.

P	W	ℓmax.
4.0～ 8.0	1.0～2.5	280
8.1～15.0	1.0～2.5	
	4.0～6.0	380

※

D	Tolerance
6～12	−0.01 −0.02
16	−0.01 −0.03

Range of guaranteed shaft diameter precision (D) (Details P.1301)

M SKH51 equivalent (Flat bar)
SK4 (Shaft)
H 58～60HRC (Flat bar)
SK4 is not annealed.

The flat bar is inserted into the shank and caulked; though grinding is performed to eliminate any trace of caulking.

H	T	d	Part Number Type	D	0.1mm increments L	P	W Selection	F 10 mm increments
10	6	*2	ERHK−F	6	80.0～680.0	4.0～ 6.0	1.0 1.2 1.5 1.8 2.0 2.5 (Available when D≧8) 4.0 (Available when D≧10) 5.0 (Available when D≧12) 6.0 (Available when D≧12)	※60～400
11		*3		7				
13	8			8		4.0～ 8.0		
15		*4		10	80.0～780.0	6.0～10.0		
17				12	80.0～880.0	8.0～12.0		※60～500
21				16		10.0～15.0		

※ℓmax. before designating.　*When 4≦P＜6, d=2, when 6≦P＜8, d=3, and when P≧8, d=4.

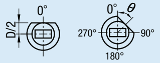
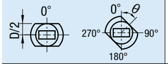
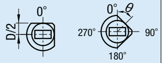
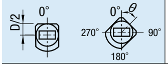
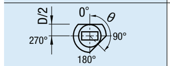
Order	Part Number	L	P	W	F
	ERHK−F12	300.0	P11.5	W1.2	F160

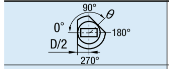
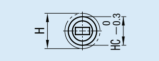
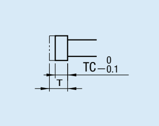
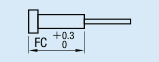
Days to Ship **Quotation**

Price **Quotation**

Alterations	Part Number	L	P	W	F(FC)	(AKC・AWC···etc.)
	ERHK−F12	300.0	P11.5	W1.2	FC165	AKC60

Alteration details P.195

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0≦AKC＜360	Quotation
	AWC	AWC=1° increments 0≦AWC＜360	
	ARC	ARC=1° increments 0≦ARC＜360	
	ADC	ADC=1° increments 0≦ADC＜360	
	KGA	KGA=1° increments 0＜KGA＜360	

Alterations	Code	Spec.	1Code
	KGD	KGD=1° increments 0＜KGD＜360	Quotation
	HC	HC=0.1mm increments D+1≦HC＜H	
	TC	TC=0.1mm increments T/2≦TC＜T T−TC≦Lmax.−L Dimension L remains unchanged. Dimensions F become shorter by (T−TC). (Dimension F remains unchanged when FC code is combined.)	
	FC	FC=1mm increments 40＜FC＜Fmax.	

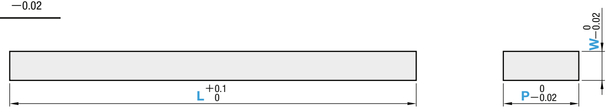
High Speed Steel
SKH51 equivalent

RECTANGULAR EJECTOR BLANKS FOR LARGE MOLD

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	T P・W
ERKB	$^{0}_{-0.02}$



M SKH51 equivalent
H 58～60HRC

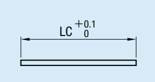
Part Number	L 10mm increments	P	W			
ERKB	30～300	6　8	1.0	1.2	1.5	2.0
		10　12　15	1.0	1.2		
	30～400				1.5	2.0

Order	Part Number	L	P	W
	ERKB	300	P10	W1.2

Days to Ship **Quotation**

Price **Quotation**

Alterations	Part Number	L(LC)	P	W
	ERKB	LC293.4	P10	W1.2

Alteration	Code	Spec.	1Code
	LC	LC=0.1mm increments 30＜LC＜Lmax.	Quotation

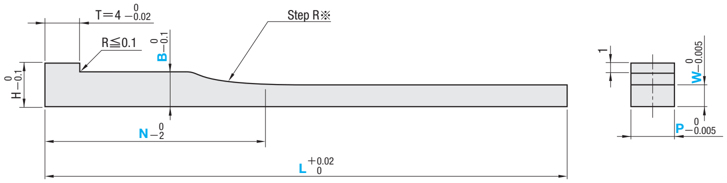
High Speed Steel
SKH51 equivalent

PRECISION RECTANGULAR EJECTOR PINS
— RECTANGULAR SHANK TYPE —

Non JIS material definition is listed on P.1351 - 1352

RoHS

ERSRP



※Step radius (R): 50～75R (This is the size of grindstone used to process R section. This is not a guaranteed value for R.)

M SKH51 equivalent
H 58～60HRC

H	T	Part Number		0.01mm increments			1mm increments	N min.
		Type	B	L	P	W	N	
2.5	4	ERSRP	1.5	50.00 ～ 100.00	0.30 ～ 3.00	0.30 ～ 1.30	N≦(L−5)	25
3.5			2.5	50.00 ～ 120.00	0.40 ～ 5.00	0.40 ～ 2.30		28
4.5			3.5	50.00 ～ 150.00	0.50 ～ 10.00	0.50 ～ 3.30		32

Order

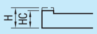
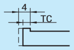
Part Number	—	L	—	P	—	W	—	N
ERSRP2.5	—	105.10	—	P4.00	—	W0.40	—	N60

Days to Ship Quotation

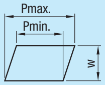
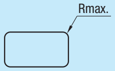
Price Quotation

Alterations

Part Number	—	L	—	P	—	W	—	N	—	(HC · TC)		
ERSRP2.5	—	90.05	—	P1.00	—	W0.40	—	N50	—	HC3.0	—	TC2

Alteration	Code	Spec.	1Code
	HC	Changes flange width B≦HC<H 0.1mm increments In relation to the flange width tolerance, alteration may create a straight piece.	Quotation
	TC	Changes flange thickness 2.0≦TC<4 TC=0.1mm increments Dimensions L and N remain unchanged 4−TC≦Lmax.−L	Quotation

Precision Standard

Squareness of the tip corner		Corner R value of the tip corner	
	W plane as the base (Pmax.−Pmin.)≦0.01		Rmax.≦0.03 (Trimming R) The tip corners have been slightly trimmed to measure the P · W dimensions. (Details P.1313)

High Speed Steel
SKH51 equivalent

D-shaped
P・W $^{0}_{-0.01}$

D-SHAPED EJECTOR PINS

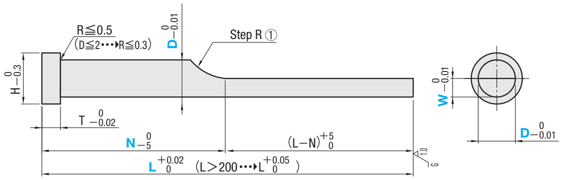
Non JIS material definition is listed on P.1351 - 1352

RoHS

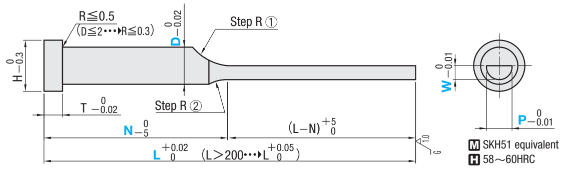
Part Number		Head Thickness (Flange)	Tip part **T** P・W
Normal type	Stepped type		
ERDP	**ERDF**	4mm (T4)	$^{0}_{-0.01}$
ERDPJ	**ERDFJ**	4・6・8mm (JIS)	

Range of guaranteed shaft diameter precision (D) (Details P.1301)
Step R ① (Details P.1302 Step R for rectangular ejector pins)
Step R ② (Details P.1302 Step R for stepped ejector pins)

(Normal type)
ERDP
ERDPJ



(Stepped type)**ERDF**
ERDFJ



M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1303)

Normal type

4mm head		JIS head		Part Number		0.01mm increments		N
H	T	H	T	Type	D	L	W	1mm increments
3	4	3	4	**ERDP** (T4) **ERDPJ**(JIS)	1.5	50.00～200.00	0.75～ 1.40	N≧30 20≦(L−N)≦150
4		4			2	50.00～250.00	1.00～ 1.90	
5		5			2.5		1.25～ 2.40	
6		6			3	50.00～300.00	1.50～ 2.90	N≧30 20≦(L−N)≦200
7		7			3.5		1.75～ 3.40	
		8	6		4		2.00～ 3.90	
8					4.5		2.25～ 4.40	
		9			5	50.00～350.00	2.50～ 4.90	
9					5.5		2.75～ 5.40	
		10			6		3.00～ 5.90	
10		11			6.5		3.25～ 6.40	
					7		3.50～ 6.90	
11		13	8		8		4.00～ 7.90	
14		14			9		4.50～ 8.90	
15		15			10		5.00～ 9.90	
17		17			12		6.00～11.90	

Stepped type

4mm head		JIS head		Part Number		0.01mm increments			N
H	T	H	T	Type	D	L	P	W	1mm increments
3	4	3	4	**ERDF** (T4) **ERDFJ**(JIS)	1.5	50.00～200.00	0.60～ 1.40	P/2≦W≦(P−0.1)	N≧30 20≦(L−N)≦150
4		4			2	50.00～250.00	0.80～ 1.90		
5		5			2.5		0.80～ 2.40		
6		6			3	50.00～300.00	1.00～ 2.90		N≧30 20≦(L−N)≦200
7		7			3.5		1.50～ 3.40		
		8	6		4		2.00～ 3.90		
8					4.5		2.50～ 4.40		
		9			5	50.00～350.00	3.00～ 4.90		
9					5.5		3.50～ 5.40		
		10			6		4.00～ 5.90		
10		11			6.5		4.50～ 6.40		
					7		5.00～ 6.90		
11		13	8		8		6.00～ 7.90		
14		14			9		6.90～ 8.90		
15		15			10		7.90～ 9.90		
17		17			12		8.90～11.90		

Order

	Part Number		L		P		W		N
(Normal type)	**ERDP5**	—	**145.05**			—	**W3.20**	—	**N95**
(Stepped type)	**ERDF2**	—	**150.00**	—	**P1.00**	—	**W0.60**	—	**N80**

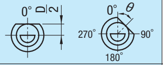
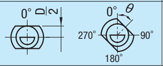
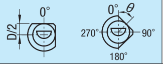
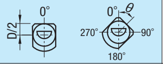
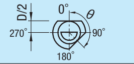
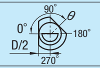
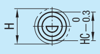
Days to Ship **Quotation**

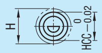
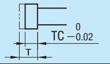
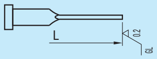
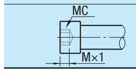
Price **Quotation**

Alterations

Part Number	—	L	—	P	—	W	—	N	—	(AKC・AWC…etc.)
ERDF 2	—	**150.00**	—	**P1.00**	—	**W0.60**	—	**N80**	—	**AKC 90**

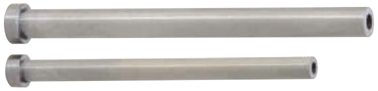
Alteration details P.195

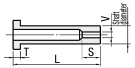
Alterations	Code	Spec.	1Code
	**AKC**	AKC=1° increments 0≦AKC<360	
	**AWC**	AWC=1° increments 0≦AWC<360	
	**ARC**	ARC=1° increments 0≦ARC<360	**Quotation**
	**ADC**	ADC=1° increments 0≦ADC<360	
	**KGA**	KGA=1° increments 0<KGA<360	
	**KGD**	KGD=1° increments 0<KGD<360	
	**HC**	HC=0.1mm increments D+1≦HC<H	

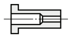
Alterations	Code	Spec.	1Code
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3	
	**TC**	TC=0.1mm increments T/2≦TC<T (Dimensions L and N remain unchanged) T−TC≦Lmax.−L	
	NHC	Numbering on the head How to order P.196	**Quotation**
	NHN	Automatic sequential numbering on the head How to order P.196	
	**TMC**	Lapping on the tip face Available when W≧0.6	
	**MC**	Tapping D8・9…M4 D10…M5 D12…M6 ERDPJ, ERDFJ Available when D≧8 Combination with other than TMC not available.	

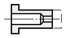
EJECTOR SLEEVE

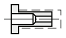
Straight Ejector Sleeve





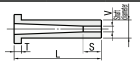


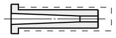




Material	Head Thickness (T)	Concentricity between the hole and shaft diameters	Hole diameter (V) Finishing	Hole diameter (V)	Smax.	Shaft diameter tolerance	Blank type	Page	L dimension designation type	Page	L・V dimension designation type			
											Shaft diameter selection	Page	Shaft diameter designation	Page
SKH51 equivalent	4mm (T4)	◎0.005	Grinding	+0.005 0	V×3 and S≦25	0 −0.005	—		—		ESV	P.279	ESVB	P.279
				+0.01 0	V×5 and S≦25						ESV−H	P.279	ESVB−H	P.279
	6・8mm (JIS)			+0.005 0	V×3 and S≦25						ESVJ	P.279	ESVJB	P.279
	4mm (T4)	◎0.01	Wire cutting & Polishing	+0.01 0	V×10 and S≦50		—		—		ESVK−H	P.281	ESVKB−H	P.281
	6・8mm (JIS)										ESVKJ−H	P.281	ESVKJB−H	P.281
SKD61 equivalent + Nitrided	4mm (T4)	◎0.03	Reaming	H7	50	−0.01 −0.02	ESNV	P.295	ESNV−LC	P.297	ESNV−L	P.299	ESNVB	P.299
	6・8mm (JIS)						—		—		ESNVJ	P.301	ESJVB	P.301
	4mm (T4)	◎0.06			100 (150)	−0.01 −0.02	ESN	P.303	ESN−LC	P.307	ESN−L	P.311	ESNB	P.311
	6・8mm (JIS)					−0.01 −0.02 (−0.01 −0.03)	ESJ	P.305	ESJL	P.309	ESNJ	P.313	ESJB	P.313

Straight Ejector Sleeves—Tapered Type—

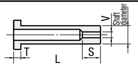


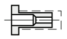


Material	Head Thickness (T)	Concentricity between the hole and shaft diameters	Hole diameter (V) Finishing	Hole diameter (V)	Smax.	Tip diameter (P) tolerance	L・V dimension designation type	Page
SKH51 equivalent	4mm (T4)	◎0.003	Grinding	+0.005 0	V×3	0 −0.005	ESVX	P.277

Short Ejector Sleeves (Straight Core Sleeves)

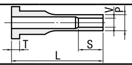
Straight Core Sleeves are published on index of Shaped Inlay Core Pins for Boss

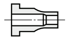


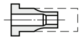


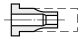
Product Name	Material	Head Thickness (T)	Concentricity between the hole and shaft diameters	Hole diameter (V) Finishing	Hole diameter (V)	Smax. (Reference)	Shaft diameter tolerance	L・V dimension designation type			
								Shaft diameter selection	Page	Shaft diameter designation	Page
Short Ejector Sleeves	SKD61 equivalent + Nitrided	4mm (T4)	◎0.06	Reamers	H7	30	−0.01 −0.02	ECB ECBB	P.315	—	—
	SKH51 equivalent		◎0.01	Wire cutting & Polishing	+0.005 0	3	0 −0.005	EPBBH	P.283		
					+0.01 0		−0.01 −0.02	EPBB-H EPBB-M			
Straight Core Sleeves	SKH51 equivalent	4mm (T4)	◎0.005	Grinding	+0.005 0	V×3 fixed	0 −0.005	CSV4T	P.531	CSVB4T	P.531
						V×3 designated		CSHKV4T	P.529	CSHKBV4T	P.529
					+0.01 0	V×3 fixed		CSHL4T	P.531	CSHB4T	P.531
				Wire cutting & Polishing		V×10 designated		CSHK4T	P.529	CSHKB4T	P.529
		6・8mm (JIS)		Grinding	+0.005 0	V×3 fixed		CSV	P.531	CSVB	P.531
						V×3 designated		CSHKV	P.529	CSHKBV	P.529
					+0.01 0	V×3 fixed		CSHL	P.531	CSHB	P.531
				Wire cutting & Polishing		V×10 designated		CSHK	P.529	CSHKB	P.529
	NAK80	4mm (T4)	◎0.005	Grinding	+0.005 0	V×3 fixed	0 −0.005	CSGLV4T	P.531	CSGBV4T	P.531
						V×3 designated		CSGKV4T	P.529	CSGKBV4T	P.529
					+0.01 0	V×3 fixed		CSGL4T	P.531	CSGB4T	P.531
				Wire cutting & Polishing		V×10 designated		CSGK4T	P.529	CSGKB4T	P.529
		6・8mm (JIS)		Grinding	+0.005 0	V×3 fixed		CSGLV	P.531	CSGBV	P.531
						V×3 designated		CSGKV	P.529	CSGKBV	P.529
					+0.01 0	V×3 fixed		CSGL	P.531	CSGB	P.531
				Wire cutting & Polishing		V×10 designated		CSGK	P.529	CSGKB	P.529

Stepped Ejector Sleeve



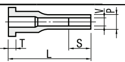


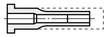




Material	Head Thickness (T)	Concentricity between the hole and shaft diameters	Hole diameter (V) Finishing	Hole diameter (V)	Smax.	Tip diameter (P) tolerance	Blank type	Page	L dimension designation type	Page	L・V dimension designation type			
											Shaft diameter selection	Page	Shaft diameter designation	Page
SKH51 equivalent	4mm (T4)	◎0.005	Grinding	+0.005 0	V×3	0 −0.005	—		—		ESVF	P.287	ESVFB	P.287
					V×3 and S≦25		—		—		ESVFE	P.289	ESVBF	P.289
				+0.01 0	V×3 and S≦25						ESVFE−H	P.289	ESVBF−H	P.289
	6・8mm (JIS)			+0.005 0	V×3 and S≦25		—		—		ESVJFE	P.289	ESVJBF	P.289
	4mm (T4)	◎0.01	Wire cutting & Polishing	+0.01 0	V×10 and S≦30		—		—		ESVKF−H	P.291	ESVKFB−H	P.291
					V×10 and S≦50		—		—		ESVKFE−H	P.293	ESVKBF−H	P.293
	6・8mm (JIS)				V×10 and S≦50						ESVKJFE−H	P.293	ESVKJBF−H	P.293
SKD61 equivalent + Nitrided	4mm (T4)	◎0.03	Reaming	H7	50	−0.01 −0.02 (−0.01 −0.03)	—		—		ESNVF	P.317	—	
	6・8mm (JIS)										ESJVF	P.317		
	4mm (T4)	◎0.06			100		ESNFT	P.319	ESNF−LC	P.321	ESNF	P.323	—	
	6・8mm (JIS)						ESJFT	P.319	ESJF−LC	P.321	ESJF	P.325		

Stepped Ejector Sleeve—Tapered Type—



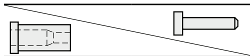


Material	Head Thickness (T)	Concentricity between the hole and shaft diameters	Hole diameter (V) Finishing	Hole diameter (V)	Smax.	Tip diameter (P) tolerance	L・V dimension designation type	Page
SKH51 equivalent	4mm (T4)	◎0.005	Grinding	+0.005 0	V×3	0 −0.005	ESVFX	P.285

Ejector Sleeve & One-step Center Pin Sets

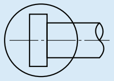
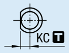
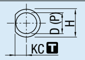
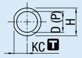
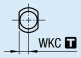
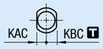
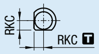
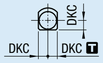
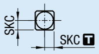
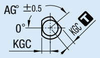
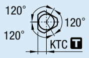
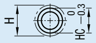
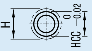
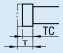
Material	Head Thickness (T)	Sleeve shape	Center Pin shape	L dimension designation	Free designation	Page
SKH51 equivalent	4mm (T4)	Straight	Tip stepped straight	ESV−S−□	—	P.327
SKD61 equivalent + Nitrided	4mm (T4)	Straight	Tip stepped straight	ESNS−□	ESNP−□	P.329,P.331
	6・8mm (JIS)			ESJS−□	ESJP−□	P.329,P.331
	4mm (T4)	Stepped	Tip stepped straight	ESNM−□	ESND−□	P.333,P.335
	6・8mm (JIS)			ESJM−□	ESJD−□	P.333,P.335

■Ejector Sleeve and Center Pin Combination Example

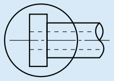
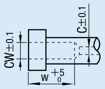
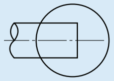
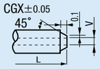
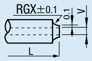
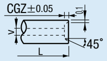
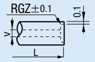
		Center Pin Shaft Diameter (DorP) Tolerance			
		0 −0.005		−0.01 −0.02	
Ejector sleeve hole diameter (V) tolerance	+0.005 0 (precision class)	○ Suitable	Because the clearance between the ejector sleeve and center pin is kept to 0.01 mm and below, this is used in cases where the plastic is conducive to the development of burrs, and for precision molds.	○ Suitable	Because the clearance between the ejector sleeve and the center pin is large, this is used in applications where smooth sliding is required. (※The hole diameter of the ejector sleeve can also be made 0.01 mm larger.)
	+0.01 0 and H7	× Unsuitable	Combination of the ejector sleeves and $^{0}_{-0.005}$ shaft-diameter tolerance center pins is unsuitable, due to the large contact surface with the center pins. Where the same dimensions have been specified for hole diameter and shaft diameter, take caution as there have been problems with the pins not fitting the holes, the pins stopping partially into the holes and sliding not being smooth.	○ Suitable	The minimum clearance required for fit between the ejector sleeve and center pin (0.01 mm) can be achieved. This is widely used in general applications, where the plastic is not conducive to the development of burrs.

ALTERATION GUIDE FOR EJECTOR SLEEVE

■Alteration Guide for Ejector Sleeve

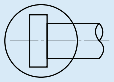
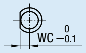
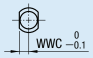
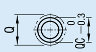
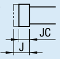
Items	Alterations	Codes	Specifications	1Code
 **Head alteration**	**Key flat cutting** 	**KC**	Single flat cutting Range of designation D/2(P/2)≦KC<H/2 To make a flat at the shaft diameter position for both straight types and stepped types  Material T KC SKH51 equivalent $^{0}_{-0.02}$ SKD61 equivalent+Nitrided $^{0}_{-0.1}$ Unit of designation Straight shaft diameter selection type (D/2)······ 0.05mm increments possible Straight shaft diameter designation type (P/2)······ 0.005mm increments possible Stepped type (D/2)······0.05mm increments possible Designation method · KC2.61 (When P5.22) · WKC3.085 (When P6.17) · KAC3.25—KBC4 (When D6.5) · RKC2.77 (When P5.54) · DKC3 (When D6) · SKC2.5 (When P5) · KGC3.5—AG125 (When D7) · KTC3.085 (When P6.17) The tolerance is SKH51 equivalent $^{0}_{-0.02}$ SKD61 equivalent+Nitrided $^{0}_{-0.1}$ even when (D or P)/2 is designated to fit to the shaft diameter (straight). The tolerance is SKH51 equivalent $^{0}_{-0.02}$ SKD61 equivalent+Nitrided $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter (stepped). To designate an arbitrary flat size  Material T KC SKH51 equivalent $^{0}_{-0.02}$ SKD61 equivalent+Nitrided $^{0}_{-0.1}$ Unit of designation 0.1mm increments only Designation method · KC1.4 · WKC2.3 · KAC1.4—KBC1.6 · RKC1.4 · DKC1.7 · SKC5.8 · KGC1.4—AGB5 · KTC2.3	Quotation
	Key flat cutting 	**WKC**	Two parallel flats cutting Range of designation D/2(P/2)≦WKC<H/2	
	Key flat cutting  For SKH51 equivalent, key flat (angled) cutting tolerance is $^{0}_{-0.02}$	**KAC** **KBC**	Varied width parallel flats cutting Range of designation D/2(P/2)≦KAC KAC<KBC<H/2	
	Key flat cutting 	**RKC**	Right angled two falts cutting Range of designation D/2(P/2)≦RKC<H/2	
	Key flat cutting  For SKD61 equivalent, key flat(angled) cutting tolerance is $^{0}_{-0.1}$	**DKC**	Three flats cutting Range of designation D/2(P/2)≦DKC<H/2	
	Key flat cutting 	**SKC**	Four flats cutting Range of designation D/2(P/2)≦SKC<H/2	
	Key flat cutting (angled) 	**KGC**	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation D/2(P/2)≦KGC<H/2 AG=1° increments 0<AG<360	
	Key flat cutting (angled) 	**KTC**	Three flats cutting at 120° Range of designation D/2(P/2)≦KTC<H/2	
	Head diameter change 	**HC**	Reduces the head diameter. Range of designation D(P)≦HC<H Unit of designation 0.1mm increments Designation method HC6.5 In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	Head diameter change (precision) 	**HCC**	Reduces the head diameter. (precision) Range of designation D(P)+1≦HCC<H—0.3 Unit of designation 0.1mm increments Designation method HCC6.1	
	Head thickness change 	**TC**	Reduces the head thickness from the standard. Dimension L remains unchanged (except blank type). Range of designation T/2≦TC<T T—TC≦Lmax.—L	

■Alteration Guide for Ejector Sleeve

Items	Alterations	Codes	Specifications	1Code
 **Changes recess**		**CW**	Two-step recessing Enlarges the recess C by adding a step. · CW=0.1mm increments CW≧C+0.5 CW≦Cmax. · W=5mm increments W≧10 W≦L—S—10 W≦200 Stepped sleeves *and (W≦L—N—20) Designation method CW8.7—W35	
 **Tip process**		**CGX**	Performs C chamfering on the tip. · CGX=0.1mm increments Available when L≦300 0.2≦CGX≦1.5 and CGX≦ $\frac{D(P)-V}{2}-0.1$ Designation method CGX0.2	Quotation
		**RGX**	Performs R chamfering on the tip. · RGX=0.1mm increments Available when L≦300 0.3≦RGX≦1.5 and RGX≦ $\frac{D(P)-V}{2}-0.1$ Designation method RGX0.3	
		**CGZ**	Performs C boring on the tip. · CGZ=0.1mm increments Available when L≦300 0.2≦CGZ≦1.0 and CGZ≦ $\frac{D(P)-V}{2}-0.1$ Designation method CGZ0.2	
		**RGZ**	Performs R boring on the tip. ·RGZ=0.1mm increments Available when L≦300 0.5≦RGZ≦1.0 and RGZ≦ $\frac{D(P)-V}{2}-0.1$ Designation method RGZ0.5	

Note that designating H/2—0.15 or more for key flat cutting alteration will create hardly any flat on the head.

■Alteration Guide for Ejector Sleeve & One-step Center Pin Sets

Items	Alterations	Codes	Specifications	1Code
 **Head alteration**	**Turning stopper processing** 	**WC**	Adds a flat on the head. Range of designation V/2≦WC<Q/2 Unit of designation ① WC=0.1mm increments ② When WC=V/2, 0.05 mm increments available. Designation method ① WC 1.4 ② WC 1.75	Quotation
	Turning stopper processing 	**WWC**	Adds two parallel flats on the head. Range of designation V/2≦WWC<Q/2 Unit of designation ① WWC=0.1mm increments ② When WWC=V/2, 0.05 mm increments available. Designation method ① WWC 1.8 ② WWC 2.75	
	Head diameter change 	**QC**	Reduces the head diameter. Range of designation V≦QC<Q Unit of designation 0.1mm increments Designation method QC 6.5	
	Head thickness change 	**JC**	Reduces the head thickness from the standard. Dimensions X and F remain unchanged. However, for ESNS and ESJS, the dimension X becomes shorter by (J—JC). J—JC≦Xmax.—X Range of designation J/2≦JC<J Unit of designation 0.1mm increments Designation method JC 3.5	

SKH51 equivalent
Thin-wall
Wall thickness
0.3mm～

STRAIGHT EJECTOR SLEEVES

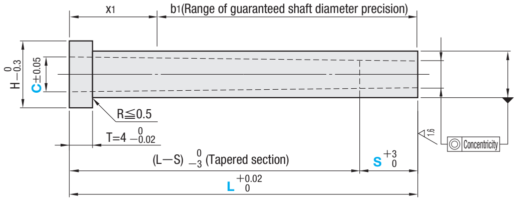
—TAPERED TYPE—

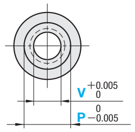
❢ Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	T P	T V	Applicable center pin shaft diameter tolerance	Concentricity
ESVX	$^{0}_{-0.005}$	$^{+0.005}_{0}$	$^{0}_{-0.005}$	◎ ϕ 0.003
ESVXN	$^{0}_{-0.005}$	$^{+0.005}_{0}$	$^{0}_{-0.005}$	◎ ϕ 0.005

❢ b_1 (Range of guaranteed shaft diameter precision)
x_1 max.=10





C=designated dimension

M SKH51 equivalent
H 58～60HRC
※Range of guaranteed base material hardness
(**Details** P.1307)
Overall quenching (No annealing on head)

H	T	Part Number		0.01mm increments				S
		Type	No.	L	P	V	C	1mm increments
6	4	ESVX ESVXN	3	20.00～110.00	2.50～3.00	1.0≦V≦P−0.6	V+0.2≦C≦P−0.4	2≦S≦V×3
7			4		3.01～4.00			
8			5		4.01～5.00			
9			6		5.01～6.00			
10			7		6.01～7.00			
11			8		7.01～8.00			

Order

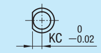
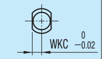
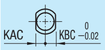
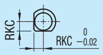
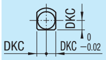
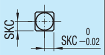
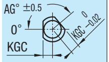
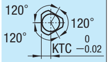
Part Number	—	L	—	P	—	V	—	C	—	S
ESVX5	—	70.00	—	P4.50	—	V3.50	—	C4.00	—	S3

Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	V	—	C	—	S	—	(KC · WKC···etc.)
ESVX5	—	70.00	—	P4.50	—	V3.50	—	C4.00	—	S3	—	KC2.5

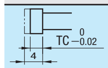
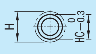
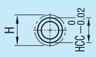
Alteration details P.275

Alterations	Code	Spec.	1Code
 KC $^{0}_{-0.02}$	KC	Single flat cutting P/2≦KC＜H/2	
 WKC $^{0}_{-0.02}$	WKC	Two flats cutting P/2≦WKC＜H/2	
 KAC KBC $^{0}_{-0.02}$	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2	Quotation
 RKC RKC $^{0}_{-0.02}$	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2	
 DKC DKC DKC $^{0}_{-0.02}$	DKC	Three flats cutting P/2≦DKC＜H/2	
 SKC SKC $^{0}_{-0.02}$	SKC	Four flats cutting P/2≦SKC＜H/2	
 AG° ±0.5 0° KGC KGC $^{0}_{-0.02}$	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 AG=1° increments 0＜AG＜360	
 120° 120° 120° KTC $^{0}_{-0.02}$	KTC	Three flats cutting at 120° P/2≦KTC＜H/2	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.005mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
 TC $^{0}_{-0.02}$ 4	TC	TC=0.1mm increments ❢ (4−TC)≦Lmax.−L ❢ 2.0≦TC＜4 Dimensions L and (L−S) remain unchanged.	Quotation
 H HC $^{0}_{-0.3}$	HC	HC=0.1mm increments ❢ Shaft diameter P≦HC＜H ❢ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC $^{0}_{-0.02}$	HCC	HCC=0.1mm increments ❢ P+1≦HCC＜H−0.3	

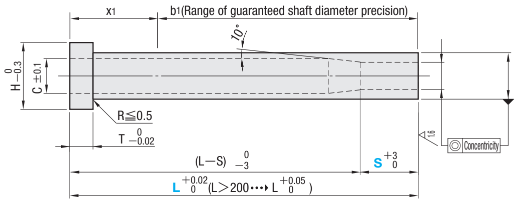
SKH51 equivalent
Wall thickness
0.6mm～

PRECISION STRAIGHT EJECTOR SLEEVES

Non JIS material definition is listed on P.1351 - 1352

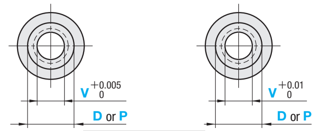
RoHS

Part Number		Head Thickness	T D・P	T V	Concentricity	Applicable center pin shaft diameter tolerance	
Shaft diameter selection type	Shaft diameter designation (0.01mm increments) type						
ESV	**ESVB**	4mm(T4)	$^{0}_{-0.005}$	$^{+0.005}_{0}$	◎ ϕ 0.005	$^{0}_{-0.005}$	
ESVJ	**ESVJB**	6・8mm(JIS)					
ESV−H	**ESVB−H**	4mm(T4)		$^{+0.01}_{0}$		$^{-0.01}_{-0.02}$	※Note that for sleeves with V dimension tolerance of $^{+0.01}_{0}$, combination with center pins that have shaft diameter tolerance $^{+0.005}_{0}$ is not recommended. $^{0}_{-0.005}$ The reason for this is the fitting sections S are longer than ones with tolerance.
ESV−M	**ESVB−M**		$^{-0.01}_{-0.02}$		◎ ϕ 0.01		



ESV ESVJ
ESVB ESVJB

ESV−H ESV−M
ESVB−H ESVB−M



C=V+(0.2～0.4)

M SKH51 equivalent
H 58～60HRC
※Range of guaranteed base material hardness
(Details P.1307)
Overall quenching (No annealing on head)

■Shaft diameter (D) selection type

4mm head		JIS head		Part Number			0.01mm increments		S
				Type					
H	T	H	T	4mm head	JIS head	D	L	V	0.5mm increments
7	4	—	—	**ESV** ($V^{+0.005}_{0}$)	—	3.5	40.00～225.00	0.80～ 2.30	ESV・ESVJ 1.0≦S≦(V×3) and S≦25
						4	40.00～250.00 ESVJ･･･▸L≦225.00	0.80～ 2.80	
8						5		0.80～ 3.80	
9		10	6		**ESVJ** ($V^{+0.005}_{0}$)	6		0.80～ 4.80	
10		11				7		0.80～ 5.80	
11		13	8	**ESV−H** ($V^{+0.01}_{0}$)		8	40.00～250.00	2.00～ 6.20	
14		14				9		2.00～ 7.20	ESV−H・ESV−M 1.0≦S≦(V×5) and S≦25
15		15				10		2.00～ 8.20	
16		17		**ESV−M** ($V^{+0.01}_{0}$)		11		2.00～ 9.20	
17						12		2.00～10.20	
18		19				13		2.00～11.20	
19						14		2.00～12.20	

■Shaft diameter (P) designation 0.01mm increments type

4mm head		JIS head		Part Number			0.01mm increments			S
				Type						
H	T	H	T	4mm head	JIS head	No.	L	P	V	0.5mm increments
7	4	—	—	**ESVB** ($V^{+0.005}_{0}$)	—	4	40.00～225.00	3.20～ 3.99	0.80≦V≦(P−1.20)	ESVB・ESVJB 1.0≦S≦(V×3) and S≦25
8						5	40.00～250.00 ESVJB･･･▸L≦225.00	4.00～ 4.99		
9		10	6		**ESVJB** ($V^{+0.005}_{0}$)	6		5.00～ 5.99		
10		11				7		6.00～ 6.99		
11		13	8	**ESVB−H** ($V^{+0.01}_{0}$)		8	40.00～250.00	7.00～ 7.99	2.00≦V≦(P−1.80)	ESVB−H・ESVB−M 1.0≦S≦(V×5) and S≦25
14		14				9		8.00～ 8.99		
15		15				10		9.00～ 9.99		
16		17		**ESVB−M** ($V^{+0.01}_{0}$)		11		10.00～10.99		
17						12		11.00～11.99		
18		19				13		12.00～12.99		
19						14		13.00～13.99		

Order

Part Number	—	L	—	P	—	V	—	S
(Shaft diameter (D) selection type)ESV6	—	150.00			—	V4.00	—	S12
(Shaft diameter (P) designation type)ESVB6	—	140.00	—	P5.95	—	V3.95	—	S11.5

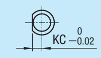
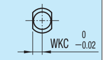
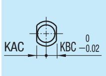
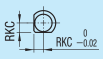
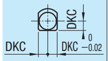
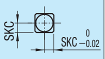
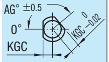
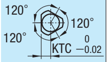
Days to Ship **Quotation**

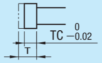
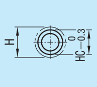
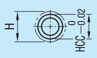
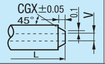
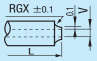
P Price **Quotation**

Alterations

Part Number	—	L	—	P	—	V	—	S	—	(KC・WKC･･･etc.)
ESV6	—	100.52			—	V4.00	—	S12	—	KC 3.0

Alteration details P.275

Alterations	Code	Spec.	1Code
	**KC**	Single flat cutting (D or P)/2≦KC＜H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting (D or P)/2≦WKC＜H/2	
	**KAC** **KBC**	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2	
	**RKC**	Two flats (right angled) cutting (D or P)/2≦RKC＜H/2	
	**DKC**	Three flats cutting (D or P)/2≦DKC＜H/2	
	**SKC**	Four flats cutting (D or P)/2≦SKC＜H/2	
	**KGC**	Two flats (angled) cutting (D or P)/2≦KGC＜H/2 AG=1° increments 0＜AG＜360	
	**KTC**	Three flats cutting at 120° (D or P)/2≦KTC＜H/2	

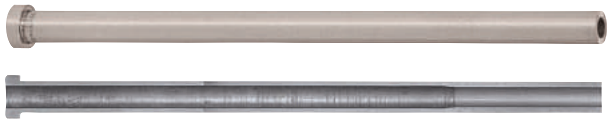
Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments (T−TC)≦Lmax.−L T/2≦TC＜T Dimensions L and (L−S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments Shaft diameter (DorP)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**HCC**	HCC=0.1mm increments (D or P)+1≦HCC＜H−0.3	
	**CGX**	CGX=0.1mm increments 0.2≦CGX≦1.5 and CGX≦$\frac{(D\ or\ P)-V}{2}$−0.1 ⊗ Combination with RGX not available.	
	**RGX**	RGX=0.1mm increments 0.3≦RGX≦1.5 and RGX≦$\frac{(D\ or\ P)-V}{2}$−0.1 ⊗ Combination with CGX not available.	

SKH51 equivalent
Concentricity◎0.01
Wall thickness 0.6mm~

PRECISION STRAIGHT EJECTOR SLEEVES

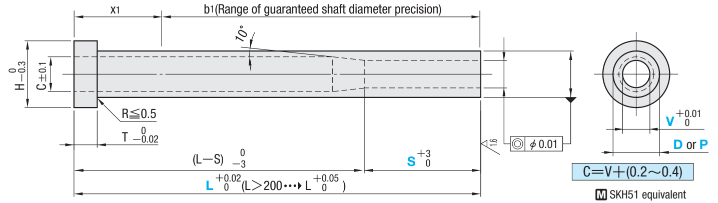
—S DIMENSION LONG TYPE—

Ⓣ Non JIS material definition is listed on P.1351 - 1352


RoHS

Part Number		Head Thickness	T D・P	T V	Applicable center pin shaft diameter tolerance	
Shaft diameter selection type	Shaft diameter designation (0.01mm increments) type					
ESVK—H	**ESVKB—H**	4mm (T4)	$^{0}_{-0.005}$	$^{+0.01}_{0}$	$^{-0.01}_{-0.02}$	※ Note that for sleeves with V dimension tolerance of $^{+0.01}_{0}$, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not available. The reason for this is fitting sections S are longer.
ESVKJ—H	**ESVKJB—H**	6・8mm (JIS)				
ESVK—M	**ESVKB—M**	4mm (T4)	$^{-0.01}_{-0.02}$			

Ⓣ When 30<S≦50, guaranteed range of V dimension precision is 10mm from tip.



M SKH51 equivalent
H 58~60HRC
※Range of guaranteed base material hardness
(**Details** ☞ **P.1307**)
Overall quenching (No annealing on head)

■Shaft diameter (D) selection type

4mm head		JIS head		Part Number			0.01mm increments		S
				Type					
H	T	H	T	4mm head	JIS head	D	L	V	0.5mm increments
7	4	—	—	**ESVK—H** ($D^{0}_{-0.005}$) **ESVK—M** ($D^{-0.01}_{-0.02}$)	—	3.5	40.00~225.00	0.80~ 2.30	1.0≦S≦(V×10) and S≦50 Ⓣ When 30<S≦50, guaranteed range of V dimension precision is 10mm from tip.
						4		0.80~ 2.80	
8						5		0.80~ 3.80	
9		10	6		**ESVKJ—H** ($D^{0}_{-0.005}$)	6		0.80~ 4.80	
10		11				7		0.80~ 5.80	
11		13	8			8	40.00~250.00	2.00~ 6.20	
14		14				9		2.00~ 7.20	
15		15				10		2.00~ 8.20	
16		17				11		2.00~ 9.20	
17						12		2.00~10.20	
18		19				13		2.00~11.20	
19						14		2.00~12.20	

■Shaft diameter (P) designation 0.01mm increments type

4mm head		JIS head		Part Number			0.01mm increments			S
				Type						
H	T	H	T	4mm head	JIS head	No.	L	P	V	0.5mm increments
7	4	—	—	**ESVKB—H** ($P^{0}_{-0.005}$) **ESVKB—M** ($P^{-0.01}_{-0.02}$)	—	4	40.00~225.00	3.20~ 3.99	0.80≦V≦(P—1.20)	1.0≦S≦(V×10) and S≦50 Ⓣ When 30<S≦50, guaranteed range of V dimension precision is 10mm from tip.
8						5		4.00~ 4.99		
9		10	6		**ESVKJB—H** ($P^{0}_{-0.005}$)	6		5.00~ 5.99		
10		11				7		6.00~ 6.99		
11		13	8			8	40.00~250.00	7.00~ 7.99	2.00≦V≦(P—1.80)	
14		14				9		8.00~ 8.99		
15		15				10		9.00~ 9.99		
16		17				11		10.00~10.99		
17						12		11.00~11.99		
18		19				13		12.00~12.99		
19						14		13.00~13.99		

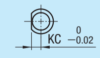
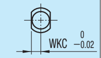
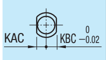
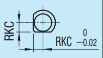
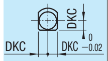
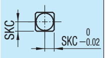
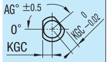
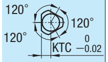
Order
Part Number — L — P — V — S
(Shaft diameter (D) selection type) ESVK—H6 — 150.00 — V4.00 — S30
(Shaft diameter (P) designation type) ESVKB—H6 — 140.00 — P5.95 — V3.95 — S28

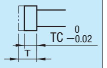
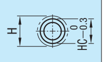
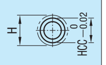
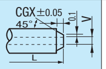
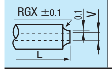
Days to Ship **Quotation**

Price **Quotation**

Alterations
Part Number — L — P — V — S — (KC・WKC…etc.)
ESVK—H6 — 100.52 — V4.00 — S30 — KC 3.0

Alteration details ☞ P.275

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting (D or P)/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting (D or P)/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting (D or P)/2≦RKC<H/2		
	**DKC**	Three flats cutting (D or P)/2≦DKC<H/2		
	**SKC**	Four flats cutting (D or P)/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting (D or P)/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° (D or P)/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments Ⓣ (T—TC)≦Lmax.—L Ⓣ T/2≦TC<T Dimensions L and (L—S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments Ⓣ Shaft diameter (D or P)≦HC<H Ⓣ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**HCC**	HCC=0.1mm increments Ⓣ (D or P)+1≦HCC<H—0.3	
	**CGX**	CGX=0.1mm increments Ⓣ $0.2 \leqq CGX \leqq 1.5$ and $CGX \leqq \frac{(D\text{ or }P)-V}{2}-0.1$ ⊗ Combination with RGX not available.	
	**RGX**	RGX=0.1mm increments Ⓣ $0.3 \leqq RGX \leqq 1.5$ and $RGX \leqq \frac{(D\text{ or }P)-V}{2}-0.1$ ⊗ Combination with CGX not available.	

■Characteristics

① The fitting section (S) can be long up to V×10.
②Precision wire cutting is used to make the dimension S longer.
③Softened layer in the bore made by wire cutting is removed by polishing. (Tolerances of the dimension V are values after polishing.)
④The ejector sleeves are of high precision (concentricity: 0.01・tolerances of the dimension V: $^{+0.01}_{0}$) in addition to having a low price.

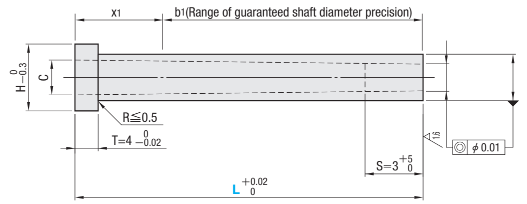
SKH51 equivalent
Concentricity◎0.01
Wall thickness 0.6mm～

SHORT EJECTOR SLEEVES (BUSHINGS FOR EJECTOR PIN)

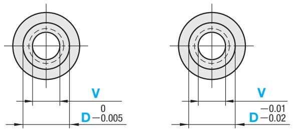
—RELIEF TAPERED TYPE—

RoHS

Part Number	T D	T V	Applicable center pin shaft diameter tolerance
EPBBH	$^{0}_{-0.005}$	$^{+0.005}_{0}$	$^{0}_{-0.005}$
EPBB—H	$^{0}_{-0.005}$	$^{+0.01}_{0}$	$^{-0.01}_{-0.02}$
EPBB—M	$^{-0.01}_{-0.02}$		



EPBBH · EPBB—H **EPBB—M**



M SKH51 equivalent
H 58～60HRC
※Range of guaranteed base material hardness
(**Details P.1307**)
Overall quenching (No annealing on head)

Non JIS material definition is listed on P.1351 - 1352

H	T	Cmax.	Part Number		0.01mm increments	
			Type	D	L	V
5	4	2.1	**EPBBH** ($D^{0}_{-0.005}$) ($V^{+0.005}_{0}$) **EPBB—H** ($D^{0}_{-0.005}$) ($V^{+0.01}_{0}$) **EPBB—M** ($D^{-0.01}_{-0.02}$) ($V^{+0.01}_{0}$)	2.5	15.00 ～ 50.00	1.00 ～ 1.30
6		2.6		3		1.31 ～ 1.80
7		3.6		4		1.91 ～ 2.80
8		4.6		5		2.91 ～ 3.80
9		5.6		6		3.91 ～ 4.80
10		6.6		7		4.91 ～ 5.80
11		7.6		8		5.81 ～ 6.80

Cmax.≧C≧V+0.5

Price Quotation

Order

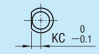
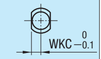
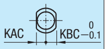
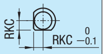
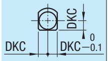
Part Number	—	L	—	V
EPBB—H4	—	29.00	—	V2.00

Days to Ship Quotation

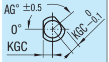
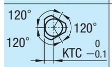
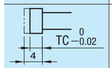
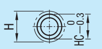
Alterations

Part Number	—	L	—	V	—	(KC · WKC···etc.)
EPBB—H4	—	29.00	—	V2.00	—	KC2.4

Quotation

Alterations	Code	Spec.	1Code
	**KC**	KC=0.1mm increments D/2≦KC<H/2	Quotation
	**WKC**	WKC=0.1mm increments D/2≦WKC<H/2	
	**KAC** **KBC**	KAC, KBC=0.1mm increments D/2≦KAC<KBC<H/2	
	**RKC**	RKC=0.1mm increments D/2≦RKC<H/2	
	**DKC**	DKC=0.1mm increments D/2≦DKC<H/2	

Alteration details P.275

Alterations	Code	Spec.	1Code
	**KGC**	KGC=0.1mm increments AG=1° increments D/2≦KGC<H/2, 0<AG<360	Quotation
	**KTC**	KTC=0.1mm increments D/2≦KTC<H/2	
	**TC**	TC=0.1mm increments 2.0≦TC<4,4—TC≦Lmax.—L Dimension L remains unchanged. Dimensions (L—S) become shorter by (4—TC).	
	**HC**	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

SKH51 equivalent
Thin-wall
Concentricity◎0.005
Wall thickness 0.3mm～

PRECISION SMALL DIAMETER · THIN-WALL STEPPED EJECTOR SLEEVE

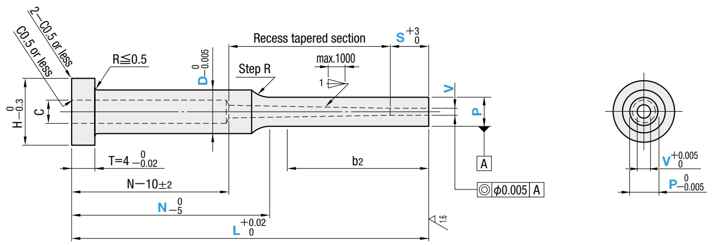
—TAPERED TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	T P	T V	Applicable center pin shaft diameter tolerance
ESVFX	0 −0.005	+0.005 0	0 −0.005 (Details P.1309)

Range of guaranteed shaft diameter precision (D) (Details P.1305)
Step R (Details P.1306)
Range of guaranteed tip-diameter precision (b2) (Details P.1306)


2−C0.5 or less
C0.5 or less
R≦0.5
Recess tapered section
S +3 0
Step R
max.1000
1
D 0 −0.005
H 0 −0.3
C
V
P
A
T=4 0 −0.02
b2
N−10±2
N 0 −5
L +0.02 0
◎ ϕ0.005 A
1.6
V +0.005 0
P 0 −0.005

Recessed hole (C) dimension varies with the shape of relief tapered section.
Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1307)
Overall quenching (No annealing on head)

4mm head		Tapered section	Cmax.	Part Number		0.01mm increments			1mm increments	
H	T			Type	D	L	P	V	N	S
6	4	Tapered 1/1000 or more	2.2	ESVFX	3	100.00～150.00	2.50～3.00	1.00～1.50	N≧L/2 (L−N≧30)	2≦S≦V×3
7			3.2		4		3.00～4.00	1.00≦V≦D−2		
8			4.2		5	100.00～200.00	D−1.5≦P≦D			
9			5.2		6					
10			6.2		7					
11			7.2		8					

Cmax.≧C≧V+0.5 Working limits for V V≦P−0.6

Order	Part Number	L	P	V	N	S
	ESVFX 3	100.00	P2.50	V1.00	N60	S2

Days to Ship Quotation

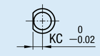
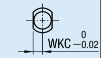
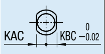
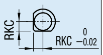
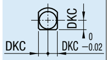
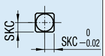
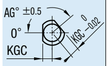
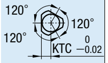
■Characteristics

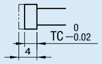
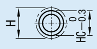
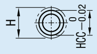
- Damage becomes unlikely in assembly of center pins due to tapered shape of recessed hole.
- Full length L can be set up to 200mm for wall thickness of 0.3mm and more.

Alterations

Part Number	L	P	V	N	S	(KC · WKC···etc.)
ESVFX 3	100.00	P2.50	V1.00	N60	S2	KC 2.5

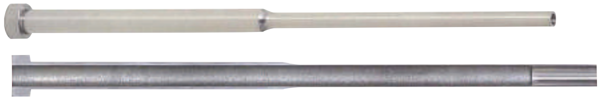
Alteration details P.275

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.5mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC＜H/2		
 KAC KBC 0 −0.02	KAC KBC	Varied width parallel flats cutting D/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
 RKC RKC 0 −0.02	RKC	Two flats (right angled) cutting D/2≦RKC＜H/2		
 DKC DKC DKC 0 −0.02	DKC	Three flats cutting D/2≦DKC＜H/2		
 SKC SKC 0 −0.02	SKC	Four flats cutting D/2≦SKC＜H/2		
 AG° ±0.5 0° KGC KGC 0 −0.02	KGC	Two flats (angled) cutting D/2≦KGC＜H/2 AG=1° increments 0＜AG＜360		
 120° 120° 120° KTC 0 −0.02	KTC	Three flats cutting at 120° D/2≦KTC＜H/2		

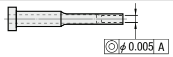
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC＜4,4−TC≦Lmax.−L Dimensions L,N and (L−S) remain unchanged.	Quotation
	HC	HC=0.1mm increments D≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	HCC=0.1mm increments D+1≦HCC＜H−0.3	

SKH51 equivalent
Thin-wall
Concentricity◎0.005Wall thickness 0.3mm～

PRECISION SMALL DIAMETER・THIN-WALL STEPPED EJECTOR SLEEVES

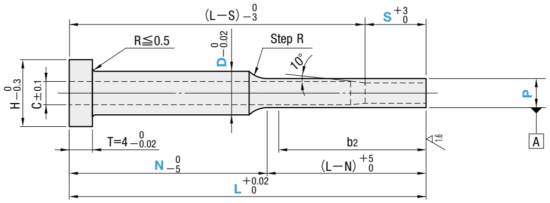


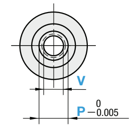
RoHS

<table>
<tr><th colspan="2">Part Number</th><th rowspan="2">🅃 P</th><th rowspan="2">🅃 V</th><th rowspan="2">🄰 Concentricity of inner diameter (V) against (outer diameter P)</th><th rowspan="2">Applicable center pin shaft diameter tolerance</th></tr>
<tr><th>D selection type</th><th>D designation type</th></tr>
<tr><td>ESVF</td><td>ESVFB</td><td>$^{0}_{-0.005}$</td><td>$^{+0.005}_{0}$</td><td>◎ϕ0.005 A</td><td>$^{0}_{-0.005}$
(Details P.1309)</td></tr>
</table>

Range of guaranteed shaft diameter precision (D) (Details P.1305)
Step R (Details P.1306)
Range of guaranteed tip-diameter precision (b2) (Details P.1306)

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details P.1307)
Overall quenching (No annealing on head)





C=V+(0.2～0.4)

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

■D selection type

H	Part Number		0.01mm increments			N	S
	Type	D	L	P	V	1mm increments	0.5mm increments
5	ESVF	2.5	40.00～ 70.00	1.80～2.19	0.80～1.40	N≧L/2 and (L−N)≧10	1.0≦S≦(V×3)
				2.20～2.45	1.00～1.60		
6		3	40.00～ 85.00	1.80～2.39	0.80～1.60		
				2.40～2.95	1.10～2.10		
			85.01～125.00	2.40～2.95	1.10～2.10		
7		3.5	40.00～ 85.00	1.80～2.39	0.80～1.60		
				2.40～3.45	1.10～2.60		
			85.01～125.00	2.40～3.45	1.10～2.60		
		4	40.00～ 85.00	1.90～2.39	0.80～1.60		
				2.40～3.95	1.10～3.10		
			85.01～125.00	2.40～3.95	1.10～3.10		
8		4.5	40.00～125.00	2.65～4.45	1.10～3.60		
		5		2.65～4.95	1.20～4.10		
9		5.5		2.65～5.45	1.20～4.60		
		6	40.00～150.00	2.90～5.95	1.60～5.10		

Working limits for V D3～6 ···› V≦P−0.6(L≦85),V≦P−0.8(L>85)D2.5 ···› V≦P−0.6 Working limits for N D2.5 ···› Nmin.=45(60.01≦L≦70.00)

■D designation type

H	Part Number	D	0.01mm increments			N	S
		0.1mm increments	L	P	V	1mm increments	0.5mm increments
6	ESVFB	2.6～2.9	40.00～ 70.00	1.80～2.39	0.80～1.60	N≧L/2 and (L−N)≧10	1.0≦S≦(V×3)
				2.40～2.80	1.10～2.20		
6 (when D=3.0) 7 (when D=3.1～3.5)		*3.0～3.5	40.00～ 85.00	1.80～2.39	0.80～1.60		
				2.40～3.40	1.10～2.60		
			85.01～125.00	2.40～3.40	1.10～2.60		
7		3.6～4.0	40.00～ 85.00	1.90～2.39	0.80～1.60		
				2.40～3.90	1.10～3.10		
			85.01～125.00	2.40～3.90	1.10～3.10		
8		4.1～4.5	40.00～125.00	2.65～4.40	1.10～3.60		
		4.6～5.0		2.65～4.90	1.20～4.10		
9		5.1～5.5		2.65～5.40	1.20～4.60		
		5.6～6.0	40.00～150.00	2.90～5.90	1.60～5.10		

Working limits for V D3.1 6 ···› V≦P−0.6(L≦85), V≦P−0.8 (L>85) D2.6 3.0 ···› V≦P−0.6 Working limits for N D2.6 3.0 ···› Nmin.=45(60.01≦L≦70.00)
In the case where the wall thickness is 0.6 or more (V≦P−1.2), please refer to ESVBF(P.305) *When D=3.0, H=6

Non JIS material definition is listed on P.1351 - 1352

Order

Part Number	D	L	P	V	N	S
ESVF 4.5		121.52	P3.25	V2.45	N70	S7.0
ESVFB	4.3	121.52	P3.25	V2.45	N70	S7.0

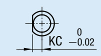
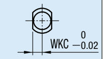
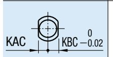
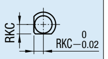
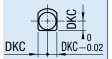
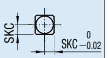
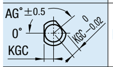
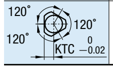
Days to Ship Quotation

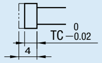
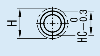
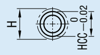
Price Quotation

Alterations

Part Number	D	L	P	V	N	S	(KC・WKC···etc.)
ESVF6		100.52	P3.55	V2.75	N65	S8.0	KC 3.5
ESVFB	6.0	100.52	P3.55	V2.75	N65	S8.0	KC 3.5

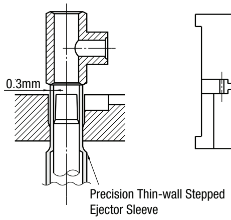
Alteration details P.275

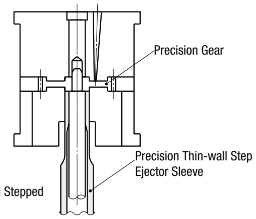
Alterations	Code	Spec.		1Code
 KC $^{0}_{-0.02}$	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC $^{0}_{-0.02}$	WKC	Two flats cutting D/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.02}$	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.02}$	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.02}$	DKC	Three flats cutting D/2≦DKC<H/2		
 SKC SKC $^{0}_{-0.02}$	SKC	Four flats cutting D/2≦SKC<H/2		
 AG°±0.5 0° KGC KGC $^{0}_{-0.02}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.02}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
 TC $^{0}_{-0.02}$ 4	TC	TC=0.1mm increments 2.0≦TC<4,4−TC≦Lmax.−L Dimensions L,N and (L−S) remain unchanged.	Quotation
 H HC $^{0}_{-0.3}$	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC $^{0}_{-0.02}$	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	

Example

Please use for molded products such as precision gears, which have narrow protruding part.





■Precautions for use

Use a structure that protects the sliding movement of ejector pins, such as precision ejector guide pins (P.961～)& and bushings (P.968～).

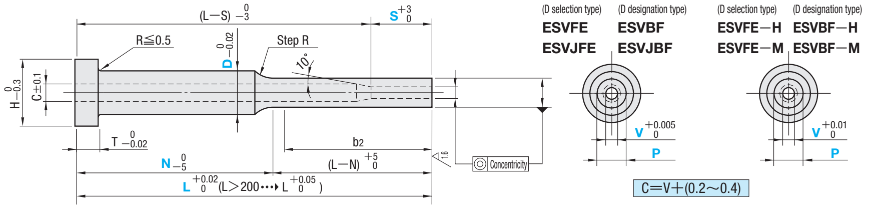
SKH51 equivalent
Wall thickness 0.6mm~

PRECISION STEPPED EJECTOR SLEEVES

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number		Head	T P	T V	Concentricity	Applicable center pin shaft diameter tolerance
D selection type	D designation type	Thickness				
ESVFE	**ESVBF**	4mm (T4)	$^{0}_{-0.005}$	$^{+0.005}_{0}$	◎ ϕ 0.005	$^{0}_{-0.005}$
ESVJFE	**ESVJBF**	6・8mm (JIS)				
ESVFE−H	**ESVBF−H**	4mm (T4)		$^{+0.01}_{0}$		$^{-0.01}_{-0.02}$ ※ Note that for sleeves with V dimension tolerance of $^{+0.01}_{0}$, combination with center pins that have shaft diameter tolerance $^{+0.005}_{0}$ is not recommended. $^{0}_{-0.005}$ The reason for this is the fitting sections S are longer than ones with tolerance.
ESVFE−M	**ESVBF−M**		$^{-0.01}_{-0.02}$		◎ ϕ 0.01	



C=V+(0.2~0.4)

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C).

M SKH51 equivalent
H 58~60HRC
※Range of guaranteed base material hardness
(**Details** P.1307)
Overall quenching (No annealing on head)

D selection type

4mm head		JIS head		Part Number			0.01mm increments			N	S
				Type							
H	T	H	T	4mm head	JIS head	D	L	P	V	1mm increments	0.5mm increments
7	4	—	—	**ESVFE** ($V^{+0.005}_{0}$)	—	4	40.00~225.00	3.20~ 3.90	0.80≦V≦(P−1.2)	N≧L/2 (L−N≧10)	ESVFE・ESVJFE 1.0≦S≦(V×3) and S≦25 ESVFE−H・ESVFE−M 1.0≦S≦(V×5) and S≦25
8						5		3.20~ 4.90			
9		10	6		**ESVJFE** ($V^{+0.005}_{0}$)	6		3.20~ 5.90			
10		11				7	40.00~250.00	3.20~ 6.90	• L≦200 2.00≦V≦(P−1.2) • L>200 2.00≦V≦(P−1.6)		
11		13	8	**ESVFE−H** ($V^{+0.01}_{0}$)		8		3.20~ 7.90			
14		14				9		3.20~ 8.90			
15		15				10		4.85~ 9.90			
16		17		**ESVFE−M** ($V^{+0.01}_{0}$)		11		5.35~10.90			
17		17				12		5.85~11.90			
18		19				13		6.35~12.90			

D designation type

4mm head		JIS head		Part Number		D	0.01mm increments			N	S
				Type							
H	T	H	T	4mm head	JIS head	0.1mm increments	L	P	V	1mm increments	0.5mm increments
7	4	—	—	**ESVBF** ($V^{+0.005}_{0}$)	—	3.5~ 4.0	40.00~225.00	3.20≦P≦(D−0.1)	0.80≦V≦(P−1.2)	N≧L/2 (L−N≧10)	ESVBF・ESVJBF 1.0≦S≦(V×3) and S≦25 ESVBF−H・ESVBF−M 1.0≦S≦(V×5) and S≦25
8						4.1~ 5.0					
9		10	6		**ESVJBF** ($V^{+0.005}_{0}$)	5.1~ 6.0					
10		11				6.1~ 7.0	40.00~250.00		• L≦200 2.00≦V≦(P−1.2) • L>200 2.00≦V≦(P−1.6)		
11		13	8	**ESVBF−H** ($V^{+0.01}_{0}$)		7.1~ 8.0					
14		14				8.1~ 9.0					
15		15				9.1~10.0		4.85≦P≦(D−0.1)			
16		17		**ESVBF−M** ($V^{+0.01}_{0}$)		10.1~11.0		5.35≦P≦(D−0.1)			
17		17				11.1~12.0		5.85≦P≦(D−0.1)			
18		19				12.1~13.0		6.35≦P≦(D−0.1)			

Order

Part Number — L — P — V — N — S
Type D
(D selection type) ESVFE 5 — 140.00 — P4.90 — V3.70 — N80 — S11.0
Part Number — D — L — P — V — N — S
(D designation type) ESVBF — 9.6 — 120.05 — P8.55 — V6.10 — N70 — S12.5

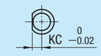
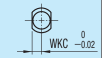
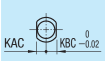
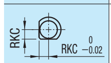
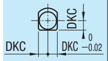
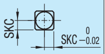
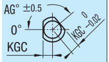
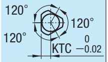
Days to Ship **Quotation**

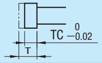
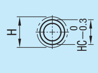
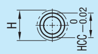
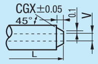
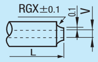
Price **Quotation**

Alterations

Part Number — D — L — P — V — N — S — (KC・WKC···etc.)
ESVBF — 9.6 — 120.05 — P8.55 — V6.10 — N70 — S12.5 — KC 4.8

Alteration details P.275

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting D/2≦KC<H/2		Quotation
	**WKC**	Two flats cutting D/2≦WKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation (D selection type) 0.5mm increments possible (D designation type) 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
	**DKC**	Three flats cutting D/2≦DKC<H/2		
	**SKC**	Four flats cutting D/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments T/2≦TC<T, T−TC≦Lmax.−L Dimensions L, N, and (L−S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**HCC**	HCC=0.1mm increments D+1≦HCC<H−0.3	
	**CGX**	CGX=0.1mm increments $0.2 \leqq CGX \leqq 1.5$ and $CGX \leqq \frac{P-V}{2} - 0.1$ Available when L−N≧50 ⊗ Combination with RGX not available.	
	**RGX**	RGX=0.1mm increments $0.3 \leqq RGX \leqq 1.5$ and $RGX \leqq \frac{P-V}{2} - 0.1$ Available when L−N≧50 ⊗ Combination with CGX not available.	

Ejector Sleeves

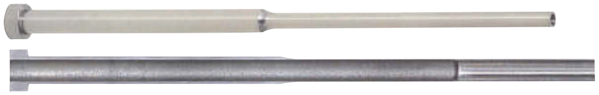
High Speed Steel
SKH51 equivalent

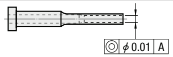
SKH51 equivalent
Thin-wall
Concentricity◎0.01
Wall thickness 0.3mm～

PRECISION SMALL DIAMETER・THIN-WALL STEPPED EJECTOR SLEEVE

—LONG S DIMENSION・SHAFT DIAMETER D SELECTION／SHAFT DIAMETER D DESIGNATION TYPE—

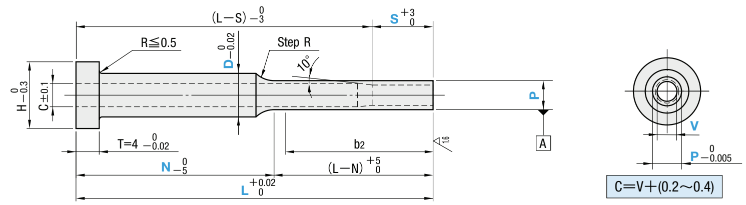
RoHS



Part Number		T P	T V	A Concentricity of inner diameter (V) against (outer diameter P)	Applicable center pin shaft diameter tolerance	
D selection type	D designation type					
ESVKF—H	**ESVKFB—H**	$^{0}_{-0.005}$	$^{+0.01}_{0}$		$^{-0.01}_{-0.02}$	※ Note that for sleeves with V dimension tolerance of $^{+0.01}_{0}$, combination with center pins that have shaft diameter tolerance $-^{0}_{0.005}$ is not recommended. The reason for this in the fitting sections S are longer. (Details P.1309)

- Range of guaranteed shaft diameter precision (D) (Details **P.1305**)
  Step R (Details **P.1306**)
- Range of guaranteed tip-diameter precision (b2) (Details **P.1306**)
- When L40～50, guaranteed range of V dimension precision is 10mm from tip.

M SKH51 equivalent
H 58～60HRC
Range of guaranteed base material hardness (Details **P.1307**)
Overall quenching (No annealing on head)



C=V+(0.2～0.4)

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details **P.1310**)

■Shaft Diameter D Selection Type

H	Part Number		0.01mm increments			N	S
	Type	D	L	P	V	1mm increments	0.5mm increments
6	**ESVKF—H** (S Dimension Long Type)	3	40.00～ 85.00	1.80～2.39	0.80～1.60	N≧L/2 and (L—N)≧10	1.0≦S≦(V×10) and S≦30
				2.40～2.95	1.10～2.10		
			85.01～125.00	2.40～2.95	1.10～2.10		
7		3.5	40.00～ 85.00	1.80～2.39	0.80～1.60		
				2.40～3.45	1.10～2.60		
			85.01～125.00	2.40～3.45	1.10～2.60		
		4	40.00～ 85.00	1.90～2.39	0.80～1.60		
				2.40～3.95	1.10～3.10		
			85.01～125.00	2.40～3.95	1.10～3.10		
8		4.5	40.00～125.00	2.65～4.45	1.10～3.60		
		5		2.65～4.95	1.20～4.10		
9		5.5		2.65～5.45	1.20～4.60		
		6	40.00～150.00	2.90～5.95	1.60～5.10		

Working limits for V V≦P—0.6(L≦85),V≦P—0.8(L>85)

■Shaft Diameter D Designation Type

H	Part Number	D	0.01mm increments			N	S
		0.1mm increments	L	P	V	1mm increments	0.5mm increments
6	**ESVKFB—H** (S Dimension Long Type)	2.6～2.9	40.00～ 70.00	1.80～2.39	0.80～1.60	N≧L/2 and (L—N)≧10	1.0≦S≦(V×10) and S≦30
				2.40～2.80	1.10～2.20		
6 (when D=3.0) 7 (when D=3.1～3.5)		*3.0～3.5	40.00～ 85.00	1.80～2.39	0.80～1.60		
				2.40～3.40	1.10～2.60		
			85.01～125.00	2.40～3.40	1.10～2.60		
7		3.6～4.0	40.00～ 85.00	1.90～2.39	0.80～1.60		
				2.40～3.90	1.10～3.10		
			85.01～125.00	2.40～3.90	1.10～3.10		
8		4.1～4.5	40.00～125.00	2.65～4.40	1.10～3.60		
		4.6～5.0		2.65～4.90	1.20～4.10		
9		5.1～5.5		2.65～5.40	1.20～4.60		
		5.6～6.0	40.00～150.00	2.90～5.90	1.60～5.10		

Working limits for V D3.1 6 ···› V≦P—0.6(L≦85), V≦P—0.8 (L>85) D2.6 3.0 ···› V≦P—0.6 Working limits for N D2.6 3.0 ···› Nmin.=45 (60.01≦L≦70.00)
In the case where the dimensions do not apply, please also refer to ESVKBF—H(P.309). *When D=3.0, H=6

Non JIS material definition is listed on P.1351 - 1352

Order

Part Number	D	L	P	V	N	S
ESVKF—H4.5		121.52	P3.25	V2.45	N70	S24.0
ESVKFB—H	4.3	121.52	P3.25	V2.45	N70	S24.0

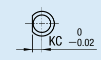
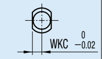
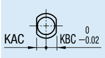
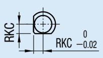
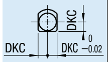
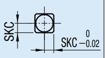
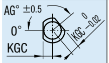
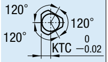
Days to Ship Quotation

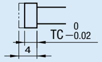
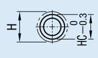
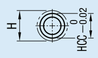
Price Quotation

Alterations

Part Number	D	L	P	V	N	S	(KC・WKC···etc.)
ESVKF—H6		100.52	P3.55	V2.75	N65	S8.0	KC 3.5
ESVKFB—H	6.0	100.52	P3.55	V2.75	N65	S8.0	KC 3.5

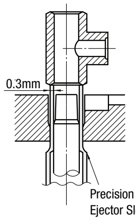
Alteration details P.275

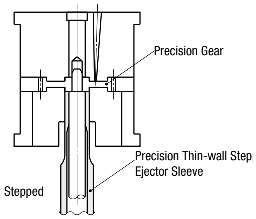
Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting D/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
	**DKC**	Three flats cutting D/2≦DKC<H/2		
	**SKC**	Four flats cutting D/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments 2.0≦TC<4,4—TC≦Lmax.—L Dimensions L,N and (L—S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**HCC**	HCC=0.1mm increments D+1≦HCC<H—0.3	

Example

Please use for molded products such as precision gears, which have narrow protruding part.





■Characteristics

About precision・thin-wall stepped ejector sleeves ESVKF—H・ESVKFB—H
① The fitting section (S) can be long up to V×10.
② Precision wire cutting is used to make the dimension S longer.
③ Softened layer in the bore made by wire cutting is removed by polishing. (Tolerances of the dimension V are values after polishing.)
④ Single wall thickness of high precision ejector sleeves (concentricity:0.01, tolerances of V dimension: $^{+0.01}_{0}$) can be designated from 0.3mm. (Pay attention to applicable size.)

■Precautions for use

Use a structure that protects the sliding movement of ejector pins, such as precision ejector guide pins (**P.961**～) and bushings (**P.968**～).

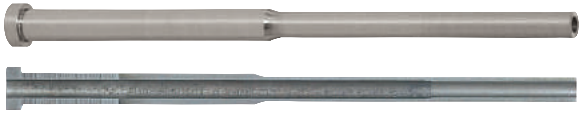
SKH51 equivalent
Concentricity◎0.01
Wall thickness 0.6mm~

PRECISION STEPPED EJECTOR SLEEVES

—S DIMENSION LONG TYPE—

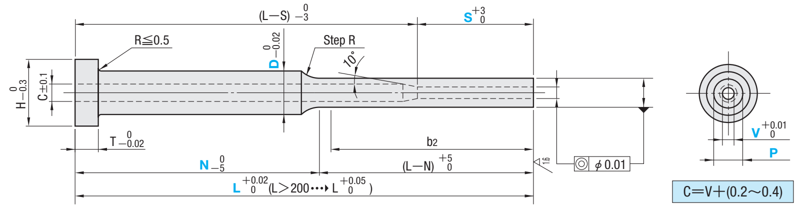
Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number		Head Thickness	**T** P	**T** V	Applicable center pin shaft diameter tolerance	
D selection type	D designation type					
ESVKFE−H	ESVKBF−H	4mm(T4)	$^{0}_{-0.005}$	$^{+0.01}_{0}$	$^{-0.01}_{-0.02}$	※Note that for sleeves with V dimension tolerance of $^{+0.01}_{0}$, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not available. The reason for this is fitting sections S are longer.
ESVKJFE−H	ESVKJBF−H	6・8mm(JIS)				
ESVKFE−M	ESVKBF−M	4mm(T4)	$^{-0.01}_{-0.02}$			

When 30<S≦50, guaranteed range of V dimension precision is 10mm from tip.



Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C).

M SKH51 equivalent
H 58~60HRC
※Range of guaranteed base material hardness
(**Details** P.1307)
Overall quenching (No annealing on head)

D selection type

4mm head		JIS head		Part Number			0.01mm increments			N	S
				Type						1mm increments	0.5mm increments
H	T	H	T	4mm head	JIS head	D	L	P	V		
7	4	—	—	ESVKFE−H ($P^{0}_{-0.005}$) ESVKFE−M ($P^{-0.01}_{-0.02}$)	—	3.5	40.00~125.00	3.20≦P≦(D−0.1)	0.80≦V≦(P−1.2)	N≧L/2 (L−N≧10)	1.0≦S≦(V×10) and S≦50 When 30<S≦50, guaranteed range of V dimension precision is 10mm from tip.
						4	・0.80≦V<2.00 40.00~150.00 ・V≧2.00 40.00~175.00				
8						5					
9		10	6		ESVKJFE−H ($P^{0}_{-0.005}$)	6					
10		11				7	40.00~250.00		・L≦200 2.00≦V≦(P−1.2) ・L>200 2.00≦V≦(P−1.6)		
11		13	8			8					
14		14				9					
15		15				10		4.85≦P≦(D−0.1)			
16		17				11		5.35≦P≦(D−0.1)			
17		17				12		5.85≦P≦(D−0.1)			
18		19				13		6.35≦P≦(D−0.1)			

D designation type

4mm head		JIS head		Part Number		D	0.01mm increments			N	S
				Type		0.1mm increments				1mm increments	0.5mm increments
H	T	H	T	4mm head	JIS head		L	P	V		
7	4	—	—	ESVKBF−H ($P^{0}_{-0.005}$) ESVKBF−M ($P^{-0.01}_{-0.02}$)	—	3.5~ 4.0	40.00~225.00	3.20≦P≦(D−0.1)	0.80≦V≦(P−1.2)	N≧L/2 (L−N≧10)	1.0≦S≦(V×10) and S≦50 When 30<S≦50, guaranteed range of V dimension precision is 10mm from tip.
8						4.1~ 5.0					
9		10	6		ESVKJBF−H ($P^{0}_{-0.005}$)	5.1~ 6.0					
10		11				6.1~ 7.0					
11		13	8			7.1~ 8.0	40.00~250.00		・L≦200 2.00≦V≦(P−1.2) ・L>200 2.00≦V≦(P−1.6)		
14		14				8.1~ 9.0					
15		15				9.1~10.0		4.85≦P≦(D−0.1)			
16		17				10.1~11.0		5.35≦P≦(D−0.1)			
17		17				11.1~12.0		5.85≦P≦(D−0.1)			
18		19				12.1~13.0		6.35≦P≦(D−0.1)			

Order

Part Number						
Type	D	L	P	V	N	S
(D selection type)ESVKFE−H	4	120.05	P3.80	V2.60	N75	S26
Part Number	D	L	P	V	N	S
(D designation type)ESVKBF−H	4.6	120.05	P3.80	V2.60	N75	S26

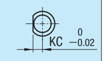
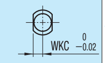
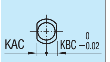
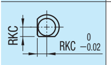
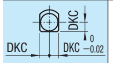
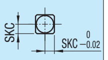
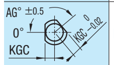
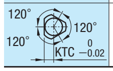
Days to Ship Quotation

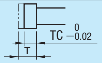
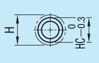
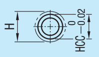
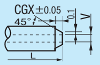
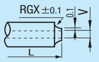
Price Quotation

Alterations

Part Number	D	L	P	V	N	S	(KC・WKC···etc.)
ESVKBF−H	4.0	120.05	P3.80	V2.60	N70	S26	KC2.5

Alteration details P.275

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T T−TC≦Lmax.−L Dimensions L, N, and (L−S) remain unchanged.	Quotation
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	CGX	CGX=0.1mm increments 0.2≦CGX≦1.5 and CGX≦$\frac{P-V}{2}$−0.1 Available when L−N≧50 ⊗ Combination with RGX not available.	
	RGX	RGX=0.1mm increments 0.3≦RGX≦1.5 and RGX≦$\frac{P-V}{2}$−0.1 Available when L−N≧50 ⊗ Combination with CGX not available.	

Characteristics

① The fitting section (S) can be long up to V×10.
② Precision wire cutting is used to make the dimension S longer.
③ Softened layer in the bore made by wire cutting is removed by polishing. (Tolerances of the dimension V are values after polishing.)
④ The ejector sleeves are of high precision (concentricity: 0.01・tolerances of the dimension V:$^{+0.01}_{0}$) in addition to having a low price.

Precautions for use

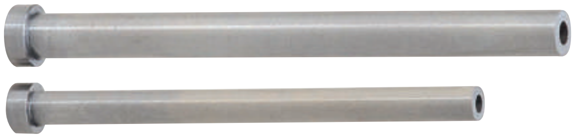
Use a construction that supports sliding and does not readily apply a load to the flange of the ejector pin, such as by using a precision ejector guide pin & bushing.

SKD61 equivalent+Nitrided
Concentricity◎0.03
4mm head

STRAIGHT EJECTOR SLEEVE

— STANDARD —

Non JIS material definition is listed on P.1351 - 1352

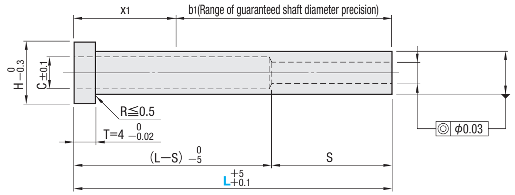


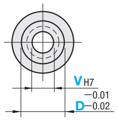
RoHS

Part Number	V	Applicable center pin shaft diameter tolerance	
ESNV	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

VH7

V≦3.0	3.5≦V≦6.0	V≧6.5
+0.010 0	+0.012 0	+0.015 0





C=V+0.5

L	75	100	125	150	175	200	225	250	275	300
S	40	50 (V1.5 ···› 40)		60 (V1.5 ···› 40)	60	80			90	

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC
b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x_1 max.=30
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

H	Part Number		L									V					
	Type	D										Selection					
7	ESNV	4	75	100	125	150						1.5					
			75	100	125	150	175	200				2.0	2.5				
8		4.5	75	100	125	150						1.5					
			75	100	125	150	175	200				2.0	2.5				
		5	75	100	125	150	175	200				2.0	2.5	3.0			
9		5.5	75	100	125	150	175	200				2.0	2.5	3.0	3.5		
		6	75	100	125	150	175	200	225	250		2.5	3.0	3.5	4.0		
10		6.5	75	100	125	150	175	200	225	250		2.5	3.0	3.5	4.0		
		7	75	100	125	150	175	200	225	250		2.5	3.0	3.5	4.0	4.5	5.0
11		7.5	75	100	125	150	175	200	225	250		3.0	3.5	4.0	4.5	5.0	
		8	75	100	125	150	175	200	225	250		4.0	4.5	5.0	5.5	6.0	
14		9		100	125	150	175	200	225	250	275	300	6.0	6.5	7.0		
15		10		100	125	150	175	200	225	250	275	300	6.0	7.0	8.0		

Order

Part Number	—	L	—	V
ESNV8	—	100	—	4.0

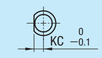
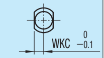
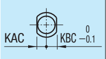
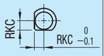
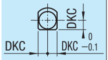
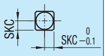
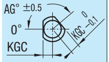
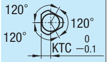
Days to Ship Quotation

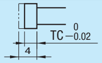
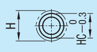
Price Quotation

Alterations

Part Number	—	L	—	V	—	(KC・WKC···etc.)
ESNV8	—	100	—	4.0	—	KC4.5

Alteration details P.275

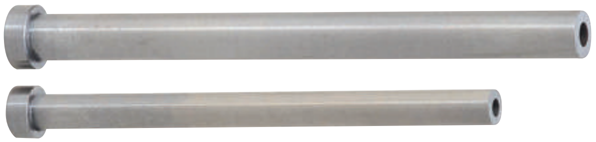
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 Dimensions L and (L−S) become shorter by (4−TC).	Quotation
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

SKD61 equivalent+Nitrided
Concentricity◎0.03
4mm head

STRAIGHT EJECTOR SLEEVE

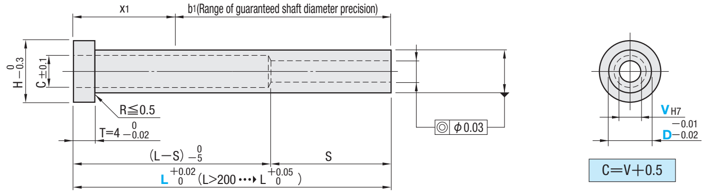
— L DIMENSION DESIGNATION TYPE —



Part Number	T V	Applicable center pin shaft diameter tolerance	
ESNV−LC	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

T V_{H7}

V≦3.0	3.5≦V≦6.0	V≧6.5
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$



M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC
b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=30
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

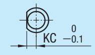
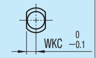
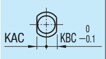
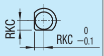
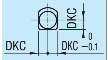
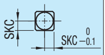
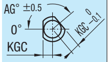
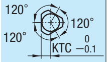
L	50.00~75.00	75.01~100.00	100.01~125.00	125.01~150.00	150.01~175.00	175.01~200.00	200.01~225.00	225.01~250.00	250.01~275.00	275.01~300.00
(L−S)	35	50 (V1.5 ···▸ 60)	75 (V1.5 ···▸ 85)	90 (V1.5 ···▸ 110)	115	120	145	170	185	210

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

Alterations

Part Number	—	L	—	V	—	(KC · WKC···etc.)
ESNV−LC8	—	123.65	—	V4.0	—	KC4.5

Alteration details P.275

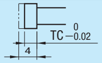
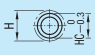
Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit and Tolerance for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter.

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments (4−TC)≦Lmax.−L 2.0≦TC<4 Dimensions L and (L−S)remain unchanged.	Quotation
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

Non JIS material definition is listed on P.1351 - 1352

H	Part Number Type	D	L 0.01mm increments	V Selection
7	ESNV−LC	4	50.00~150.00	1.5
			50.00~200.00	2.0
				2.5
8		4.5	50.00~150.00	1.5
			50.00~200.00	2.0
				2.5
		5	50.00~200.00	2.0
				2.5
				3.0
9		5.5	50.00~200.00	2.0
				2.5
				3.0
				3.5
		6	50.00~250.00	2.5
				3.0
				3.5
				4.0
10		6.5	50.00~250.00	2.5
				3.0
				3.5
				4.0
		7	50.00~250.00	2.5
				3.0
				3.5
				4.0
				4.5
				5.0
11		7.5	50.00~250.00	3.0
				3.5
				4.0
				4.5
				5.0
		8	50.00~250.00	4.0
				4.5
				5.0
				5.5
				6.0
14		9	80.00~300.00	6.0
				6.5
				7.0
15		10	80.00~300.00	6.0
				7.0
				8.0

Order

Part Number	—	L	—	V
ESNV−LC8	—	123.65	—	V4.0

Days to Ship Quotation

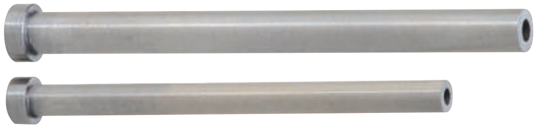
Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.03
4mm head

STRAIGHT EJECTOR SLEEVE

—SHAFT DIAMETER SELECTION TYPE・SHAFT DIAMETER DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

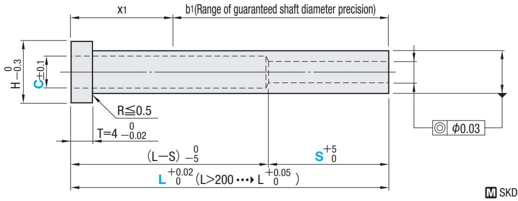


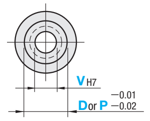
RoHS

Part Number Shaft diameter selection type	Part Number Shaft diameter designation (0.01mm increments) type	T D・P	T V	Applicable center pin shaft diameter tolerance	
ESNV−L	**ESNVB**	−0.01 −0.02	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

T VH7

V≦3.0	3.1≦V≦6.0	V≧6.1
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$


X1
b1(Range of guaranteed shaft diameter precision)
H $^{0}_{-0.3}$
C±0.1
R≦0.5
T=4 $^{0}_{-0.02}$
(L−S) $^{0}_{-5}$
S $^{+5}_{0}$
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)
◎ ϕ0.03



C=designated dimension

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

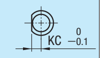
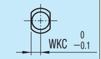
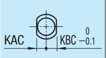
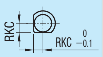
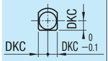
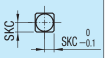
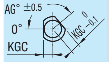
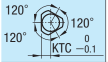
b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=30
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

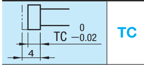
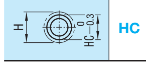
Nitriding may extend to the head as it is applied after dimension V and P machining.
To insert a stepped center pin, the following condition must be met:
the sleeve's recess diameter (C) ≧ the center pin's shaft diameter (D) +1.0 (Details P.1310)

Alterations

Part Number	—	L	—	P	—	V	—	C	—	S	—	(KC・WKC···etc.)
ESNV−L8	—	200.05			—	V4.1	—	C4.6	—	S32	—	KC4.5
ESNVB8	—	150.00	—	P7.55	—	V4.0	—	C5.0	—	S32	—	KC3.775

Alteration details P.275

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (DorP)/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible The tolerance is $^{0}_{-0.1}$ even when (D or P)/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting (DorP)/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting (DorP)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting (DorP)/2≦RKC<H/2		
	DKC	Three flats cutting (DorP)/2≦DKC<H/2		
	SKC	Four flats cutting (DorP)/2≦SKC<H/2		
	KGC	Two flats (angled) cutting (DorP)/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° (DorP)/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments (4−TC)≦Lmax.−L 2.0≦TC<4 Dimensions L and (L−S) remain unchanged.	Quotation
	HC	HC=0.1mm increments (D or P)≦HC<H In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

■Shaft diameter (D) selection type

H	Part Number Type	Part Number D	L 0.01mm increments	V 0.1mm increments	C 0.1mm increments	Cmax.	S 1mm increments
7	ESNV−L	4	40.00~200.00	1.5~2.5	C≧V+0.5	3.0	20~50 (D4, D4.5 (When V1.5~V1.9) 20~40) L / (L−S)min. 40.00~60.00 / 20 60.01~ / 30
8		4.5	40.00~250.00	1.5~2.5			
		5		2.0~3.0		3.5	
9		5.5		2.0~3.5		4.0	
		6	40.00~300.00	2.0~4.0		4.5	
10		6.5		2.0~4.5		5.0	
		7		2.0~5.0		5.5	
11		7.5		2.0~5.5		6.0	
		8		2.5~6.0		6.5	20~50 L / (L−S)min. 40.00~60.00 / 20 60.01~70.00 / 30 70.01~80.00 / 40 80.01~ / 50
14		9		2.5~7.0		7.5	
15		10		2.5~8.0		8.5	

■Shaft diameter (P) designation 0.01mm increments type

H	Part Number Type	Part Number No.	L 0.01mm increments	P 0.01mm increments	V 0.1mm increments	C 0.1mm increments	Cmax.	S 1mm increments
7	ESNVB	4	40.00~200.00	3.50~3.99	1.5~1.9	C≧V+0.5 and C≦P−1.5	2.5	20~50 (No.4 (When V1.5~V1.9) 20~40) L / (L−S)min. 40.00~60.00 / 20 60.01~ / 30
8		5	40.00~250.00	4.01~4.99	2.0~2.5		3.0	
9		5.5		5.01~5.49	2.0~3.4		4.0	
		6	40.00~300.00	5.51~5.99	2.0~3.9		4.5	
10		6.5		6.01~6.49	2.0~4.4		5.0	
		7		6.51~6.99	2.0~4.9		5.5	
11		7.5		7.01~7.49	2.0~5.4		6.0	
		8		7.51~7.99	2.5~5.9		6.5	20~50 L / (L−S)min. 40.00~60.00 / 20 60.01~70.00 / 30 70.01~80.00 / 40 80.01~ / 50
15		10		8.01~9.99	2.5~7.9		8.5	

V≦P−2.0

Order

Part Number	—	L	—	P	—	V	—	C	—	S
(Shaft diameter(D)selection type) ESNV−L8	—	200.05			—	V4.1	—	C5.0	—	S32
(Shaft diameter (P) designation type) ESNVB8	—	200.05	—	P7.55	—	V4.1	—	C5.0	—	S32

Days to Ship Quotation

Price Quotation

Ejector Sleeves

Dies Steel SKD61 equivalent + Nitrided

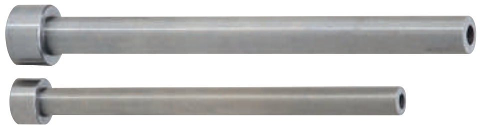
SKD61 equivalent+Nitrided
Concentricity◎0.03
JIS head

STRAIGHT EJECTOR SLEEVE

— SHAFT DIAMETER SELECTION TYPE・SHAFT DIAMETER DESIGNATION TYPE —

Non JIS material definition is listed on P.1351 - 1352

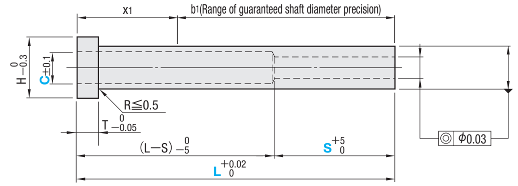
RoHS

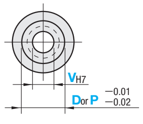


Part Number		T D・P	T V	Applicable center pin shaft diameter tolerance	
Shaft diameter selection type	Shaft diameter designation (0.01mm increments) type				
ESNVJ	**ESJVB**	−0.01 −0.02	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended.The reason for this is the fitting sections S are longer. (Details P.1309)

T VH7

V≦3.0	3.1≦V≦6.0	V≧6.1
+0.010 0	+0.012 0	+0.015 0





C=designated dimension

Nitriding may extend to the head as it is applied after dimension V and P machining.

To insert a stepped center pin, the following condition must be met:

the sleeve's recess diameter (C) ≧ the center pin's shaft diameter (D) +1.0 (Details P.1310)

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=35
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Order

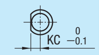
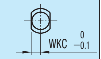
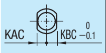
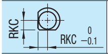
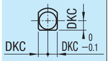
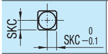
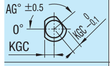
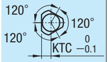
Part Number	—	L	—	P	—	V	—	C	—	S
(Shaft diameter (D) selection type) ESNVJ8	—	200.05			—	V4.5	—	C5.0	—	S32
(Shaft diameter (P) designation type) ESJVB8	—	200.05	—	P7.55	—	V5.0	—	C5.5	—	S40

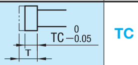
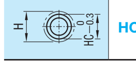
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	V	—	C	—	S	—	(KC・WKC···etc.)
ESNVJ8	—	200.05			—	V4.0	—	C5.0	—	S32	—	KC 4.5
ESJVB8	—	200.05	—	P7.55	—	V5.0	—	C5.5	—	S40	—	HC11.5

Alteration details P.275

Alterations	Code	Spec.		1Code
	**KC**	Single flat cutting (DorP)/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible The tolerance is $^{0}_{-0.1}$ even when (D or P)/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting (DorP)/2≦WKC<H/2		
	**KAC** **KBC**	Varied width parallel flats cutting (DorP)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	**RKC**	Two flats (right angled) cutting (DorP)/2≦RKC<H/2		
	**DKC**	Three flats cutting (DorP)/2≦DKC<H/2		
	**SKC**	Four flats cutting (DorP)/2≦SKC<H/2		
	**KGC**	Two flats (angled) cutting (DorP)/2≦KGC<H/2 AG=1° increments 0<AG<360		
	**KTC**	Three flats cutting at 120° (DorP)/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments T/2≦TC<T, T−TC≦Lmax.−L Dimensions L and (L−S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments (DorP)≦HC<H In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

■Shaft diameter (D) selection type

H	T	Part Number		L	V	C	Cmax.	S
		Type	D	0.01mm increments	0.1mm increments	0.1mm increments		1mm increments
8	6	**ESNVJ**	4	40.00~200.00	1.5~2.5	C≧V+0.5	3.0	20~50 (D4, D4.5 (When V1.5~V1.9) 20~40) L 40.00~60.00: (L−S)min. 20 L 60.01~: (L−S)min. 30
			4.5	40.00~250.00				
9			5	40.00~300.00	2.0~3.0		3.5	
			5.5		2.0~3.5		4.0	
10			6		2.5~4.0		4.5	
11			6.5		2.5~4.5		5.0	
			7				5.0	
12			7.5		2.5~5.0		5.5	
13	8		8		2.5~5.5		6.0	20~50 L 40.00~60.00: (L−S)min. 20 L 60.01~70.00: (L−S)min. 30 L 70.01~80.00: (L−S)min. 40 L 80.01~: (L−S)min. 50
14			9		2.5~6.5		7.0	
15			10		4.0~7.5		8.0	

■Shaft diameter (P) designation 0.01mm increments type

H	T	Part Number		L	P	V	C	Cmax.	S
		Type	No.	0.01mm increments	0.01mm increments	0.1mm increments	0.1mm increments		1mm increments
8	6	**ESJVB**	4	40.00~200.00	3.50~3.99	1.5~1.9	C≧V+0.5 and C≦P−1.5	2.5	20~50 (No.4, No.4.5 (When V1.5~V1.9) 20~40) L 40.00~60.00: (L−S)min. 20 L 60.01~: (L−S)min. 30
			4.5	40.00~250.00	4.01~4.49	1.5~2.4		3.0	
9			5	40.00~300.00	4.51~4.99	2.0~2.9		3.5	
			5.5		5.01~5.49	2.0~3.4		4.0	
10			6		5.51~5.99	2.0~3.9		4.5	
11			6.5		6.01~6.49	2.0~4.4		5.0	
			7		6.51~6.99	2.0~4.9		5.5	
12			7.5		7.01~7.49	2.0~5.4		6.0	20~50 L 40.00~60.00: (L−S)min. 20 L 60.01~70.00: (L−S)min. 30 L 70.01~80.00: (L−S)min. 40 L 80.01~: (L−S)min. 50
13	8		8		7.51~7.99	2.5~5.9		6.5	
15			10		8.01~9.99	2.5~7.9		8.5	

V≦P−2.0

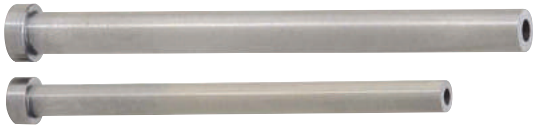
P Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm head

STRAIGHT EJECTOR SLEEVE

— STANDARD —

Non JIS material definition is listed on P.1351 - 1352

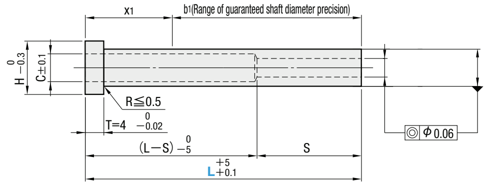


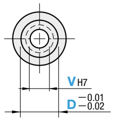
RoHS

Part Number	V	Applicable center pin shaft diameter tolerance	
ESN	H7	$^{-0.01}_{-0.02}$	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

VH7

V≦3.0	3.5≦V≦6.0	6.5≦V≦10.0	V≧11.0
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$	$^{+0.018}_{0}$





C=V+0.5

L tolerance is set to $^{+5}_{+0.1}$.

L	75	100	125	150	175	200	250	300
S	40	50(V1.5 ··· 40)		60(V1.5 ··· 40)	60	80		90

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
X1 max.=30
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Order

Part Number	—	L	—	V
ESN8	—	100	—	4.0

Note that when you order ESN, entry of an alphabetical character (V) is not required.

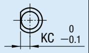
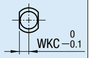
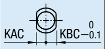
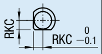
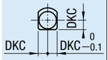
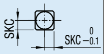
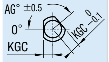
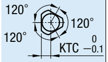
Days to Ship Quotation

Alterations

Part Number	—	L	—	V	—	(KC・WKC···etc.)
ESN8	—	200	—	4.0	—	KC4.5

Quotation

Alteration details P.275

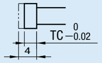
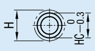
Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit and Tolerance for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter.

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 Dimensions L and (L−S) become shorter by (4−TC).	Quotation
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

H	Part Number Type	Part Number D	L 75	L 100	L 125	L 150	L 175	L 200	L 250	L 300	V Selection
7	ESN	4					—				1.5
									—		2.0
											2.5
8		4.5					—				1.5
									—		2.0
											2.5
		5							—		2.0
											2.5
											3.0
9		5.5							—		2.0
											2.5
											3.0
											3.5
		6								—	2.5
											3.0
											3.5
											4.0
10		6.5								—	2.5
											3.0
											3.5
											4.0
		7								—	2.5
											3.0
											3.5
											4.0
						Quotation					4.5
											5.0
11		7.5								—	3.0
											3.5
											4.0
											4.5
											5.0
		8								—	4.0
											4.5
											5.0
											5.5
											6.0
14		9	—								6.0
											6.5
											7.0
15		10	—								6.0
											7.0
											8.0
17		12	—								8.0
											9.0
18		13	—							—	8.0
											9.0
											10.0
21		16	—								10.0
											11.0
											12.0

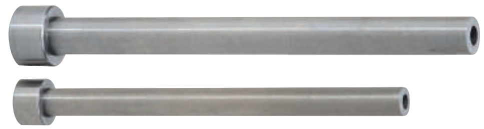
Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
JIS head

STRAIGHT EJECTOR SLEEVE

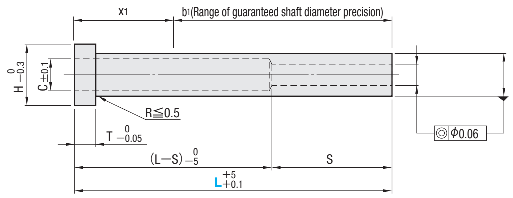
— STANDARD —

Non JIS material definition is listed on P.1351 - 1352



RoHS

Part Number	V	Applicable center pin shaft diameter tolerance	
ESJ	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

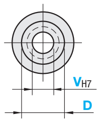


D

D≦12	D≧15
−0.01 −0.02	−0.01 −0.03

VH7

V≦3	3.5≦V≦6	6.5≦V≦10	V≧12
+0.010 0	+0.012 0	+0.015 0	+0.018 0



C=V+0.5

L	100	120	140	160	180	200	225	250	275	300	325	350	375	400	425	450	475	500
S	50(V1.5 ⋯ 40)			75			100			115			150					

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

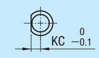
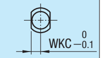
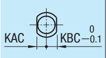
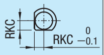
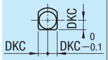
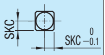
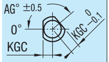
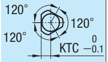
M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

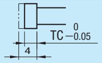
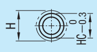
b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=35
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Alterations

Part Number	—	L	—	V	—	(KC・WKC⋯etc.)
ESJ8	—	200	—	4	—	KC4.0

Alteration details P.275

Alterations	Code	Spec.		1Code
 KC $^{0}_{-0.1}$	**KC**	Single flat cutting D/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC $^{0}_{-0.1}$	**WKC**	Two flats cutting D/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.1}$	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.1}$	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	**DKC**	Three flats cutting D/2≦DKC<H/2		
 SKC SKC $^{0}_{-0.1}$	**SKC**	Four flats cutting D/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
 TC $^{0}_{-0.05}$ 4	**TC**	TC=0.1mm increments T/2≦TC<T Dimensions L and (L−S) become shorter by (T−TC).	Quotation
 H HC $^{0}_{-0.3}$	**HC**	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

H	T	Part Number Type	D	L	V Selection
8	6	ESJ	4	100 120 140	1.5
				100 120 140 160 180 200	2 2.5
			4.5	100 120 140	1.5
				100 120 140 160 180 200	2 2.5
9			5	100 120 140 160 180 200 225	2 2.5 3
				250 275 300	3
			5.5	100 120 140 160 180 200 225	2 2.5 3
				250 275 300	3
10			6	100 120 140 160 180 200 225 250 275 300	2 2.5 3 3.5 4
				325 350 375 400 425 450	3 3.5
11			6.5	100 120 140 160 180 200 225 250 275 300	2 2.5 3 3.5 4
				325 350 375 400 425 450	3 3.5 4
			7	100 120 140 160 180 200 225 250 275 300	2 2.5 3 3.5 4 4.5
				325 350 375 400 425 450	3 3.5 4 4.5
12			7.5	100 120 140 160 180 200 225 250 275 300	3 3.5 4 4.5
				325 350 375	3.5 4 4.5
13	8		8	100 120 140 160 180 200 225 250 275 300	2 2.5 3 3.5 4 4.5 5 5.5
				325 350 375 400 425 450	3 3.5 4 4.5 5
				475 500	5
14			9	100 120 140 160 180 200 225 250 275 300	2 2.5 3 3.5 4 4.5 5 5.5
				325 350 375 400 425 450	3 3.5 4 4.5 5
				475 500	5 5.5 6
15			10	100 120 140 160 180 200 225 250 275 300 325 350 375 400 425 450	4 4.5 5 5.5 6 6.5 7
				475 500	5 5.5 6 6.5 7
17			12	100 120 140 160 180 200 225 250 275 300 325 350 375 400 425 450	4 4.5 5 5.5 6 6.5 7 8 8.5
				475 500	5 5.5 6 6.5 7 8
20			15	200 225 250 275 300 325 350 375 400 425 450 475 500	9 10
25			20	200 225 250 275 300 325 350 375 400 425 450 475 500	12 15

Order

Part Number	—	L	—	V
ESJ6.5	—	120	—	2.5

Note that when you order ESJ, entry of an alphabetical character (V) is not required.

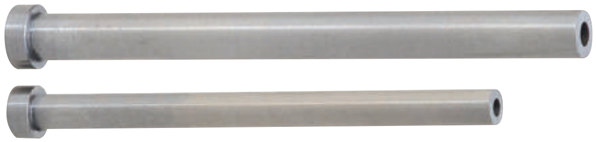
Days to Ship **Quotation**

Price **Quotation**

SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm head

STRAIGHT EJECTOR SLEEVE

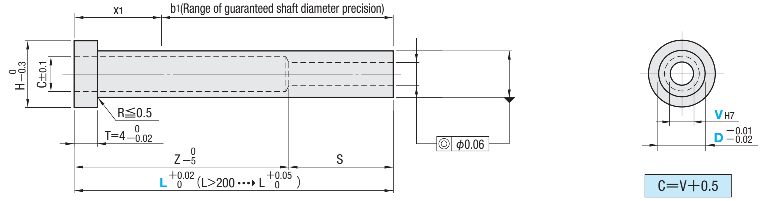
—L DIMENSION DESIGNATION TYPE—



Part Number	T V	Applicable center pin shaft diameter tolerance	
ESN−LC	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

T VH7

V≦3.0	3.5≦V≦6.0	6.5≦V≦10.0	V≧11.0
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$	$^{+0.018}_{0}$


X1
b1(Range of guaranteed shaft diameter precision)
H $^{0}_{-0.3}$
C±0.1
R≦0.5
T=4 $^{0}_{-0.02}$
Z $^{0}_{-5}$
S
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
◎ ϕ0.06
V H7
D $^{-0.01}_{-0.02}$

C=V+0.5

S dimension depends on the designated L dimension.
S=L−Z

L	50.00〜75.00	75.01〜100.00	100.01〜125.00	125.01〜150.00	150.01〜175.00	175.01〜200.00	200.01〜250.00	250.01〜300.00
Z	35	50(V1.5 ···▸ 60)	75(V1.5 ···▸ 85)	90(V1.5 ···▸ 110)	115	120	170	210

Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC
b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=30
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Order

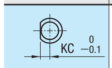
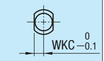
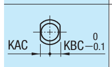
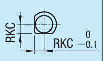
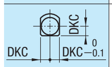
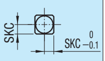
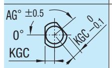
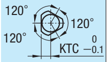
Part Number	—	L	—	V
ESN−LC8	—	123.65	—	V4.0

Days to Ship Quotation

Alterations

Part Number	—	L	—	V	—	(KC・WKC···etc.)
ESN−LC8	—	196.25	—	V4.0	—	KC4.5

Alteration details P.275

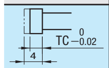
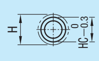
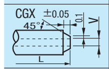
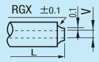
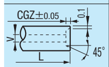
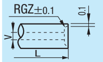
Alterations	Code	Spec.	1Code
	**KC**	Single flat cutting D/2≦KC<H/2	
	**WKC**	Two flats cutting D/2≦WKC<H/2	
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2	Quotation
	**DKC**	Three flats cutting D/2≦DKC<H/2	
	**SKC**	Four flats cutting D/2≦SKC<H/2	
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit and Tolerance for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter.

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments 2.0≦TC<4,4−TC≦Lmax.−L Dimension L remains unchanged. Dimension Z becomes shorter by (4−TC).	
	**HC**	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**CGX**	CGX=0.1mm increments $0.2 \leqq CGX \leqq 1.5$ and $CGX \leqq \frac{D-V}{2}-0.1$ ⊗ Combination with RGX/CGZ/RGZ not available.	Quotation
	**RGX**	RGX=0.1mm increments $0.3 \leqq RGX \leqq 1.5$ and $RGX \leqq \frac{D-V}{2}-0.1$ ⊗ Combination with CGX/CGZ/RGZ not available.	
	**CGZ**	CGZ=0.1mm increments $0.2 \leqq CGZ \leqq 1.0$ and $CGZ \leqq \frac{D-V}{2}-0.1$ ⊗ Combination with CGX/RGX/RGZ not available.	
	**RGZ**	RGZ=0.1mm increments $0.5 \leqq RGZ \leqq 1.0$ and $RGZ \leqq \frac{D-V}{2}-0.1$ ⊗ Combination with CGX/RGX/CGZ not available.	

Non JIS material definition is listed on P.1351 - 1352

H	Part Number		L	V
	Type	D	0.01mm increments	Selection
7	ESN−LC	4	50.00〜150.00	1.5
			50.00〜200.00	2.0
				2.5
8		4.5	50.00〜150.00	1.5
			50.00〜200.00	2.0
				2.5
		5	50.00〜200.00	2.0
				2.5
				3.0
9		5.5	50.00〜200.00	2.0
				2.5
				3.0
				3.5
		6	50.00〜250.00	2.5
				3.0
				3.5
				4.0
10		6.5	50.00〜250.00	2.5
				3.0
				3.5
				4.0
		7	50.00〜250.00	2.5
				3.0
				3.5
				4.0
				4.5
				5.0
11		7.5	50.00〜250.00	3.0
				3.5
				4.0
				4.5
				5.0
		8	50.00〜250.00	4.0
				4.5
				5.0
				5.5
				6.0
14		9	80.00〜300.00	6.0
				6.5
				7.0
15		10	80.00〜300.00	6.0
				7.0
				8.0
17		12	80.00〜300.00	8.0
				9.0
18		13	80.00〜300.00	8.0
				9.0
				10.0
21		16	80.00〜300.00	10.0
				11.0
				12.0

For L dimension less than 50mm, please use Short Ejector Sleeves ECB and ECBB. (Only for D4・5・6・7・8・10) P.315

Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
JIS head

STRAIGHT EJECTOR SLEEVE

—L DIMENSION DESIGNATION TYPE—

RoHS

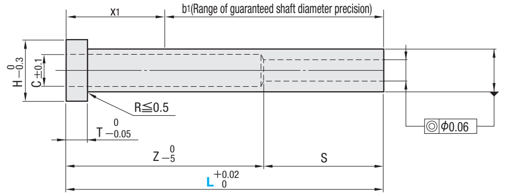
Part Number	Ⓣ V	Applicable center pin shaft diameter tolerance	
ESJL	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{\ 0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

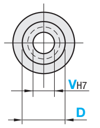
Ⓣ D

D≦12	D≧15
−0.01 −0.02	−0.01 −0.03

Ⓣ V_{H7}

V≦3	3.5≦V≦6	6.5≦V≦10	V≧12
+0.010 0	+0.012 0	+0.015 0	+0.018 0





C=V+0.5

ⓘ S dimension depends on the designated L dimension.
S=L−Z

L	80.00~ 100.00	100.01 ~ 120.00	120.01 ~ 140.00	140.01 ~ 160.00	160.01 ~ 180.00	180.01 ~ 225.00	225.01 ~ 250.00	250.01 ~ 275.00	275.01 ~ 300.00	300.01 ~ 325.00	325.01 ~ 350.00	350.01 ~ 375.00	375.01 ~ 400.00	400.01 ~ 425.00	425.01 ~ 450.00	450.01 ~ 475.00	475.01 ~ 500.00
Z	50 (60)	70 (80)	90 (100)	85	105	125	150	175	185	210	235	225	250	275	300	325	350

ⓘ Figures in parentheses are applicable for V1.5.

ⓘ Note that the stepped center pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

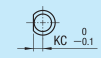
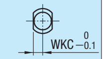
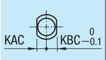
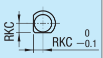
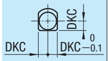
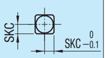
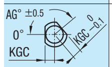
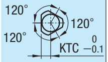
Ⓜ SKD61 equivalent+Nitrided
Ⓗ Surface : 900HV
Base material : 40±3HRC

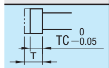
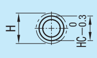
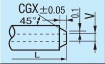
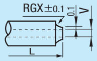
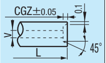
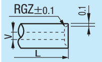
ⓘ b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=35
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Alterations

Part Number	—	L	—	V	—	(KC · WKC···etc.)
ESJL8	—	200.05	—	V4	—	KC4.0

Alteration details P.275

Alterations	Code	Spec.	1Code
	**KC**	Single flat cutting D/2≦KC<H/2 About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible ⓘ The tolerance is $^{\ 0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	**WKC**	Two flats cutting D/2≦WKC<H/2	
	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2	
	**DKC**	Three flats cutting D/2≦DKC<H/2	
	**SKC**	Four flats cutting D/2≦SKC<H/2	
	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2	

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments ⓘ T/2≦TC<T,(T−TC)≦Lmax.−L ⓘ V Dimension L remains unchanged. Dimension Z becomes shorter by (T−TC).	
	**HC**	HC=0.1mm increments ⓘ D≦HC<H ⓘ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**CGX**	CGX=0.1mm increments ⓘ $0.2 \leqq CGX \leqq 1.5$ and $CGX \leqq \frac{D-V}{2}-0.1$ ⓘ Available when L≦300 ⊗ Combination with RGX/CGZ/RGZ not available.	Quotation
	**RGX**	RGX=0.1mm increments ⓘ $0.3 \leqq RGX \leqq 1.5$ and $RGX \leqq \frac{D-V}{2}-0.1$ ⓘ Available when L≦300 ⊗ Combination with CGX/CGZ/RGZ not available.	
	**CGZ**	CGZ=0.1mm increments ⓘ $0.2 \leqq CGZ \leqq 1.0$ and $CGZ \leqq \frac{D-V}{2}-0.1$ ⓘ Available when L≦300 ⊗ Combination with CGX/RGX/RGZ not available.	
	**RGZ**	RGZ=0.1mm increments ⓘ $0.5 \leqq RGZ \leqq 1.0$ and $RGZ \leqq \frac{D-V}{2}-0.1$ ⓘ Available when L≦300 ⊗ Combination with CGX/RGX/CGZ not available.	

ⓘ Non JIS material definition is listed on P.1351 - 1352

H	T	Part Number Type	Part Number D	L 0.01mm increments	V Selection
8	6	ESJL	4	80.00~140.00	1.5 2 2.5
				140.01~200.00	2 2.5
			4.5	80.00~140.00	1.5 2 2.5
				140.01~200.00	2 2.5
9			5	80.00~225.00	2 2.5 3
				225.01~300.00	3
			5.5	80.00~225.00	2 2.5 3
				225.01~300.00	3
10			6	80.00~300.00	2 2.5 3 3.5 4
				300.01~450.00	3 3.5
11			6.5	80.00~300.00	2 2.5 3 3.5 4
				300.01~450.00	3 3.5 4
			7	80.00~300.00	2 2.5 3 3.5 4 4.5
				300.01~450.00	3 3.5 4 4.5
12			7.5	80.00~300.00	3 3.5 4 4.5
				300.01~375.00	3.5 4 4.5
13	8		8	80.00~300.00	2 2.5 3 3.5 4 4.5 5 5.5
				300.01~450.00	3 3.5 4 4.5 5
				450.01~500.00	5
14			9	80.00~300.00	2 2.5 3 3.5 4 4.5 5 5.5
				300.01~450.00	3 3.5 4 4.5 5
				450.01~500.00	5 5.5 6
15			10	80.00~450.00	4 4.5 5 5.5 6 6.5 7
				450.01~500.00	5 5.5 6 6.5 7
17			12	80.00~450.00	4 4.5 5 5.5 6 6.5 7 8 8.5
				450.01~500.00	5 5.5 6 6.5 7 8
20			15	180.01~500.00	9 10
25			20	180.01~500.00	12 15

Order

Part Number	—	L	—	V
ESJL6.5	—	115.50	—	V2.5

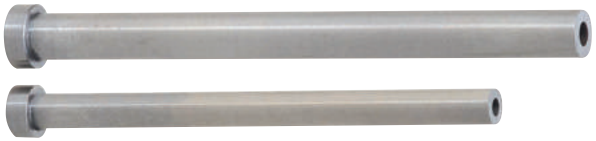
Days to Ship Quotation

Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm head

STRAIGHT EJECTOR SLEEVE

—SHAFT DIAMETER SELECTION TYPE・SHAFT DIAMETER DESIGNATION TYPE—

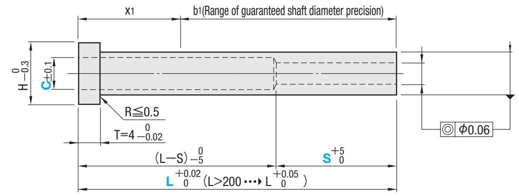


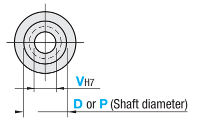
RoHS

Part Number		D・P	V	Applicable center pin shaft diameter tolerance	
Shaft diameter selection type	Shaft diameter designation (0.01mm increments) type				
ESN—L	ESNB	−0.01 −0.02	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

VH7

V≦3.0	3.1≦V≦6.0	6.1≦V≦10.0	V≧10.1
+0.010 0	+0.012 0	+0.015 0	+0.018 0


X1
b1(Range of guaranteed shaft diameter precision)
H 0 −0.3
C±0.1
R≦0.5
T=4 0 −0.02
(L−S) 0 −5
S +5 0
L +0.02 0 (L>200 ··· L +0.05 0)
◎ Φ0.06



C=designated dimension

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

b1(Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=30
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Nitriding may extend to the head as it is applied after dimension V and P machining.

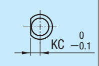
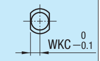
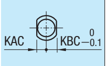
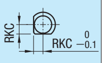
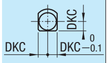
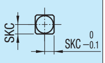
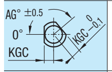
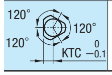
To insert a stepped center pin, the following condition must be met:

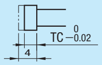
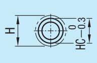
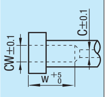
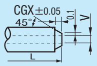
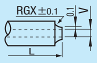
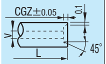
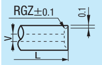
the sleeve's recess diameter (C)≧the center pin's shaft diameter(D)+1.0 (Details P.1310)

Alterations

Part Number	—	L	—	P	—	V	—	C	—	S	—	(KC・WKC···etc.)
ESN—L8	—	200.05			—	V4.1	—	C4.6	—	S32	—	KC4.5
ESNB 8	—	150.00	—	P7.55	—	V4.0	—	C5.0	—	S32	—	KC3.775

Alteration details P.275

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (DorP)/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible The tolerance is $^{0}_{-0.1}$ even when (D or P)/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting (DorP)/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting (DorP)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting (DorP)/2≦RKC<H/2		
	DKC	Three flats cutting (DorP)/2≦DKC<H/2		
	SKC	Four flats cutting (DorP)/2≦SKC<H/2		
	KGC	Two flats (angled) cutting (DorP)/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120 (DorP)/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments (4−TC)≦Lmax.−L 2.0≦TC<4 Dimensions L and (L−S) remain unchanged.	
	HC	HC=0.1mm increments (DorP)≦HC<H In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	CW	Two-step recessing (Makes recess C into two-steps and widens it) CW=0.1mm increments W=5mm increments C+0.5≦CW≦Cmax.,CW≦P−1.5 10≦W≦L−S−10,W≦200	Quotation
	CGX	CGX=0.1mm increments 0.2≦CGX≦1.5 and CGX≦ $\frac{D(P)-V}{2}-0.1$ ⊗ Combination with RGX/CGZ/RGZ not available.	
	RGX	RGX=0.1mm increments 0.3≦RGX≦1.5 and RGX≦ $\frac{D(P)-V}{2}-0.1$ ⊗ Combination with CGX/CGZ/RGZ not available.	
	CGZ	CGZ=0.1mm increments 0.2≦CGZ≦1.0 and CGZ≦ $\frac{D(P)-V}{2}-0.1$ ⊗ Combination with CGX/RGX/RGZ not available.	
	RGZ	RGZ=0.1mm increments 0.5≦RGZ≦1.0 and RGZ≦ $\frac{D(P)-V}{2}-0.1$ ⊗ Combination with CGX/RGX/CGZ not available.	

Non JIS material definition is listed on P.1351 - 1352

Shaft diameter (D) selection type

H	Part Number		L	V	C	Cmax.	S
	Type	D	0.01mm increments	0.1mm increments	0.1mm increments		1mm increments
7	ESN—L	4	40.00~200.00	1.5~ 2.5	C≧V+0.5	3.0	20~100 (D4~5.5 When V1.5~V1.9 20~40) L (L−S)min. 40.00~60.00 20 60.01~ 30
8		4.5	40.00~250.00 *V dimension 40.00~150.00	1.5~ 2.5			
				*2.6~ 3.0		3.5	
		5		1.5~ 3.0		3.5	
				*3.1~ 3.5		4.0	
9		5.5		1.5~ 3.5		4.0	
				*3.6~ 4.0		4.5	
		6	40.00~300.00 *V dimension 40.00~150.00	2.0~ 4.0		4.5	
				*4.1~ 4.5		5.0	
10		6.5		2.0~ 4.5		5.0	
		7		2.0~ 5.0		5.5	
11		7.5		2.0~ 5.5		6.0	
		8		2.5~ 6.0		6.5	
14		9		2.5~ 7.0		7.5	20~100 L (L−S)min. 40.00~60.00 20 60.01~70.00 30 70.01~80.00 40 80.01~ 50
15		10		2.5~ 8.0		8.5	
17		12		2.5~10.0		10.5	
18		13		2.5~11.0		11.5	
21		16		2.5~13.0		13.5	
25		20		3.0~16.0		16.5	

Shaft diameter (P) designation 0.01mm increments type

H	Part Number		L	P	V	C	Cmax.	S
	Type	No.	0.01mm increments	0.01mm increments	0.1mm increments	0.1mm increments		1mm increments
7	ESNB	4	40.00~200.00	3.50~ 3.99	1.5~ 1.9	C≧V+0.5 and C≦P−1.5	2.5	20~100 (No.4 When V1.5~V1.9 20~40) L (L−S)min. 40.00~60.00 20 60.01~ 30
8		5	40.00~250.00	4.01~ 4.99	2.0~ 2.5		3.0	
9		5.5		5.01~ 5.49	2.0~ 3.4		4.0	
		6	40.00 ~300.00	5.51~ 5.99	2.0~ 3.9		4.5	
10		6.5		6.01~ 6.49	2.0~ 4.4		5.0	
		7		6.51~ 6.99	2.0~ 4.9		5.5	
11		7.5		7.01~ 7.49	2.0~ 5.4		6.0	
		8		7.51~ 7.99	2.5~ 5.9		6.5	20~100 L (L−S)min. 40.00~60.00 20 60.01~70.00 30 70.01~80.00 40 80.01~ 50
14		9		8.01~ 8.99	2.5~ 6.9		7.5	
15		10		9.01~ 9.99	2.5~ 7.9		8.5	
18		13		10.01~12.99	2.5~10.9		11.5	
21		16		13.01~15.99	2.5~13.0		13.5	
25		20		16.01~19.99	3.0~16.0		16.5	

V≦P−2.0

Order

	Part Number	—	L	—	P	—	V	—	C	—	S
(D selection type)	ESN—L8	—	200.05			—	V4.1	—	C5.0	—	S32
(P designation type)	ESNB8	—	200.05	—	P7.55	—	V4.1	—	C5.0	—	S32

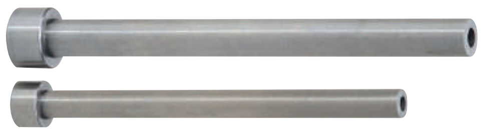
Days to Ship Quotation

Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
JIS head

STRAIGHT EJECTOR SLEEVE

—SHAFT DIAMETER SELECTION TYPE · SHAFT DIAMETER DESIGNATION TYPE—

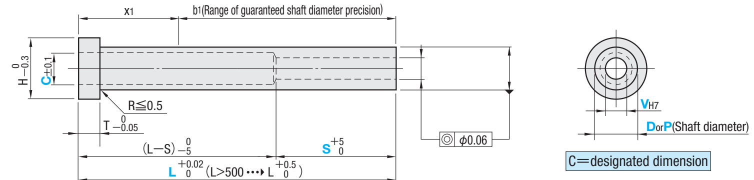


RoHS

Part Number		D or P	T D · P	T V	Applicable center pin shaft diameter tolerance	
Shaft diameter selection type	Shaft diameter designation (0.01mm increments) type					
ESNJ	**ESJB**	D or P≦12.00	−0.01 −0.02	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)
		D or P>12.00	−0.01 −0.03			

T V H7

V≦3.0	3.1≦V≦6.0	6.1≦V≦10.0	V≧10.1
+0.010 0	+0.012 0	+0.015 0	+0.018 0


X1
b1(Range of guaranteed shaft diameter precision)
H −0.3 / 0
C±0.1
R≦0.5
T −0.05 / 0
(L−S) −5 / 0
S +5 / 0
L +0.02 / 0 (L>500 ···▸ L +0.5 / 0)
◎ ϕ0.06
VH7
DorP(Shaft diameter)

C=designated dimension

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

- b1 (Range of guaranteed shaft diameter precision) (Details P.1305)
x1 max.=35
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

- Nitriding may extend to the head as it is applied after dimension V and P machining.
- To insert a stepped center pin, the following condition must be met:

the sleeve's recess diameter (C)≧the center pin's shaft diameter(D)+1.0 (Details P.1310)

Order

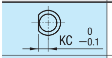
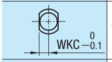
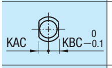
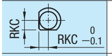
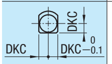
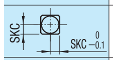
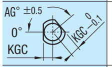
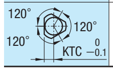
Part Number	L	P	V	C	S
(D selection type) ESNJ8	200.05		V4.5	C5.0	S32
(P designation type) ESJB8	200.05	P7.55	V5.0	C5.5	S40

Days to Ship Quotation

Alterations

Part Number	L	P	V	C	S	(KC · WKC···etc.)
ESNJ8	200.05		V4.0	C5.0	S32	KC4.5
ESJB8	200.05	P7.55	V5.0	C5.5	S40	HC11.5

Alteration details P.275

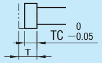
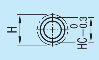
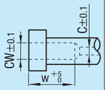
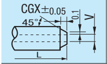
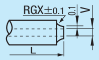
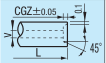
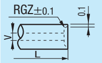
Alterations	Code	Spec.	1Code
	**KC**	Single flat cutting (DorP)/2≦KC<H/2	Quotation
	**WKC**	Two flats cutting (DorP)/2≦WKC<H/2	
	**KAC** **KBC**	Varied width parallel flats cutting (DorP)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	**RKC**	Two flats (right angled) cutting (DorP)/2≦RKC<H/2	
	**DKC**	Three flats cutting (DorP)/2≦DKC<H/2	
	**SKC**	Four flats cutting (DorP)/2≦SKC<H/2	
	**KGC**	Two flats (angled) cutting (DorP)/2≦KGC<H/2 AG=1° increments 0<AG<360	
	**KTC**	Three flats cutting at 120° (DorP)/2≦KTC<H/2	

About Designation Unit and Tolerance for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation
Shaft diameter (D) selection 0.05mm increments possible
Shaft diameter (P) designation 0.005mm increments possible

- The tolerance is $^{0}_{-0.1}$ even when (D or P)/2 is designated to fit to the shaft diameter.

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments T/2≦TC<T, T−TC≦Lmax.−L Dimensions L and (L−S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments (DorP)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**CW**	Two-step recessing (Makes recess C into two-steps and widens it) CW=0.1mm increments W=5mm increments C+0.5≦CW≦C max. CW≦13.5 10≦W≦L−S−10,W≦200	
	**CGX**	CGX=0.1mm increments 0.2≦CGX≦1.5 and CGX≦$\frac{D(P)-V}{2}$−0.1 Available when L≦300 Combination with RGX/CGZ/RGZ not available.	
	**RGX**	RGX=0.1mm increments 0.3≦RGX≦1.5 and RGX≦$\frac{D(P)-V}{2}$−0.1 Available when L≦300 Combination with CGX/CGZ/RGZ not available.	
	**CGZ**	CGZ=0.1mm increments 0.2≦CGZ≦1.0 and CGZ≦$\frac{D(P)-V}{2}$−0.1 Available when L≦300 Combination with CGX/RGX/RGZ not available.	
	**RGZ**	RGZ=0.1mm increments 0.5≦RGZ≦1.0 and RGZ≦$\frac{D(P)-V}{2}$−0.1 Available when L≦300 Combination with CGX/RGX/CGZ not available.	

- Non JIS material definition is listed on P.1351 - 1352

■Shaft diameter (D) selection type

H	T	Part Number		L		V	C	Cmax.	S
		Type	D	0.01mm increments	0.1mm increments	0.1mm increments	0.1mm increments		1mm increments
8	6	**ESNJ**	4	40.00~200.00	—	1.5~ 2.5	C≧V+0.5 (When L>300 0.5mm increments)	3.0	20~100 (D4, D4.5 When V1.5~V1.9 20~40) L / (L−S)min. 40.00~60.00 / 20 60.01~ / 30
			4.5	40.00~250.00					
9			5	40.00~300.00		2.0~ 3.0		3.5	
			5.5			2.0~ 3.5		4.0	
10			6	40.00~500.00		2.0~ 4.0		4.5	
11			6.5			2.5~ 4.5		5.0	
			7					5.0	
12			7.5			2.5~ 5.0		5.5	
13	8		8	40.00~500.00		2.5~ 5.5		6.0	20~100 L / (L−S)min. 40.00~60.00 / 20 60.01~70.00 / 30 70.01~80.00 / 40 80.01~ / 50
14			9			2.5~ 6.5		7.0	
15			10			4.0~ 7.5		8.0	
17			12		500.1~800.0	4.0~ 8.5		9.0	
20			15			5.0~10.5		11.0	
21			16			5.0~11.5		12.0	
25			20	40.00~500.00		7.0~16.0		17.0	

■Shaft diameter (P) designation 0.01mm increments type

H	T	Part Number		L	P	V	C	Cmax.	S
		Type	No.	0.01mm increments	0.01mm increments	0.1mm increments	0.1mm increments		1mm increments
8	6	**ESJB**	4	40.00~200.00	3.50~ 3.99	1.5~ 1.9	C≧V+0.5 and C≦P−1.5	2.5	20~100 (D4, D4.5 When V1.5~V1.9 20~40) L / (L−S)min. 40.00~60.00 / 20 60.01~ / 30
			4.5	40.00~250.00	4.01~ 4.49	1.5~ 2.4		3.0	
9			5	40.00~300.00	4.51~ 4.99	2.0~ 2.9		3.5	
			5.5		5.01~ 5.49	2.0~ 3.4		4.0	
10			6		5.51~ 5.99	2.0~ 3.9		4.5	
11			6.5		6.01~ 6.49	2.0~ 4.4		5.0	
			7		6.51~ 6.99	2.0~ 4.9		5.5	
12			7.5		7.01~ 7.49	2.0~ 5.4		6.0	
13	8		8		7.51~ 7.99	2.5~ 5.9		6.5	20~100 L / (L−S)min. 40.00~60.00 / 20 60.01~70.00 / 30 70.01~80.00 / 40 80.01~ / 50
14			9		8.01~ 8.99	2.5~ 6.9		7.5	
15			10		9.01~ 9.99	2.5~ 7.9		8.5	
17			12		10.01~11.99	2.5~ 9.9		10.5	
20			15		12.01~14.99	2.5~12.0		12.5	
21			16		15.01~15.99	3.0~13.0		13.5	
25			20		16.01~19.99	3.0~16.0		17.0	

- V≦P−2.0

Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm head

SHORT EJECTOR SLEEVE (BUSHING FOR EJECTOR PINS)

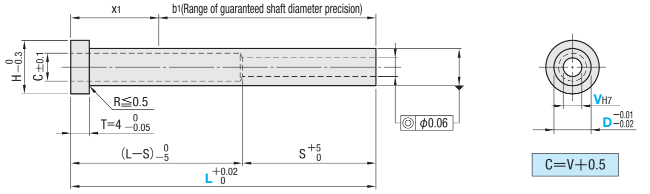
Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number	V	Applicable center pin shaft diameter tolerance	
ECB **ECBB**	H7	−0.01 −0.02	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

VH7

V≦3.0	3.1≦V≦6.0	V≧6.1
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$



C=V+0.5

S dimension depends on the designated L dimension.

L	S
15.00～30.00	S=L
30.01～50.00	S=L−20

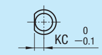
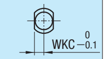
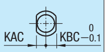
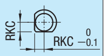
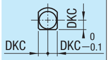
Range of guaranteed shaft diameter precision (Details P.1305)
x_1 max.10
M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

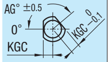
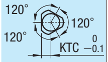
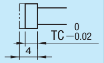
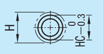
Alterations

Part Number	—	L	—	V	—	(KC・WKC···etc.)
ECB8	—	50.00	—	V4.0	—	KC4.5

Quotation

Alteration details P.275

Alterations	Code	Spec.	1Code
	**KC**	KC=0.1mm increments D/2≦KC<H/2	Quotation
	**WKC**	WKC=0.1mm increments D/2≦WKC<H/2	
	**KAC** **KBC**	KAC, KBC=0.1mm increments D/2≦KAC<KBC<H/2	
	**RKC**	RKC=0.1mm increments D/2≦RKC<H/2	
	**DKC**	DKC=0.1mm increments D/2≦DKC<H/2	

Alterations	Code	Spec.	1Code
	**KGC**	KGC=0.1mm increments AG=1° increments D/2≦KGC<H/2, 0<AG<360	Quotation
	**KTC**	KTC=0.1mm increments D/2≦KTC<H/2	
	**TC**	TC=0.1mm increments 2.0≦TC<4,4−TC≦Lmax.−L Dimension L remains unchanged. Dimensions (L−S) become shorter by (4−TC).	
	**HC**	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

■V dimension selection type

H	C (V+0.5)	VH7		Part Number Type	D	L 0.01mm increments	V
7	2.0	1.5	$^{+0.010}_{0}$	ECB	4	15.00～50.00	1.5
	2.5	2.0					2.0
	3.0	2.5					2.5
8	2.5	2.0			5		2.0
	3.0	2.5					2.5
	3.5	3.0					3.0
9	3.5	3.0			6		3.0
	4.0	3.5	$^{+0.012}_{0}$				3.5
	4.5	4.0					4.0
10	3.5	3.0	$^{+0.010}_{0}$		7		3.0
	4.5	4.0	$^{+0.012}_{0}$				4.0
11	4.5	4.0			8		4.0
	5.5	5.0					5.0
	6.5	6.0					6.0
15	5.5	5.0			10		5.0
	6.5	6.0					6.0
	8.5	8.0	$^{+0.015}_{0}$				8.0

ECB is the standard to fit to center pins with shaft diameter tolerance $^{-0.01}_{-0.02}$. It is not available for center pins with shaft diameter tolerance $^{0}_{-0.005}$.
For sleeves with dimension L of 50.01 or more, use ESN−LC. (P.307)
Nitriding may extend to the head as it is applied after dimension V machining.

■V dimension designation type

H	VH7		Part Number Type	D	L 0.01mm increments	V 0.1mm increments
7	1.6～2.9	$^{+0.010}_{0}$	ECBB	4	15.00～50.00	1.6～1.9
						2.1～2.4
8				5		2.1～2.4
						2.6～2.9
9	3.1～5.9	$^{+0.012}_{0}$		6		3.1～3.4
						3.6～3.9
10				7		3.1～3.9
						4.1～5.0
11				8		4.1～4.9
						5.1～5.9
15				10		5.1～5.9
	6.1～7.9	$^{+0.015}_{0}$				6.1～7.9

ECBB is the standard to fit to center pins with shaft diameter tolerance $^{-0.01}_{-0.02}$. It is not available for center pins with shaft diameter tolerance $^{0}_{-0.005}$.
For sleeves with dimension L of 50.01 or more, use ESN−L. (P.311)
Nitriding may extend to the head as it is applied after dimension V machining.

Order

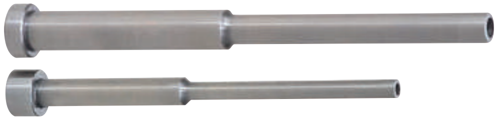
Part Number	—	L	—	V
ECB6	—	20.53	—	V3.0

Days to Ship Quotation

Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.03
4mm Head・JIS

STEPPED EJECTOR SLEEVE



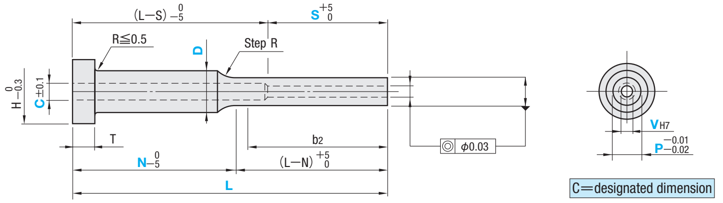
RoHS

Part Number	Head Thickness (T)	🅃 P	🅃 D	🅃 T	🅃 V	🅃 L L≦200	L>200	Applicable center pin shaft diameter tolerance
ESNVF	4mm (T4)	−0.01 −0.02	−0.01 −0.02	0 −0.02	H7	+0.02 0	+0.05 0	−0.01 −0.02
ESJVF	6・8mm (JIS)		−0.02 −0.04	0 −0.05				

※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

🅃 VH7

V≦3.0	3.1≦V≦6.0	V≧6.1
+0.010 0	+0.012 0	+0.015 0



C=designated dimension

🄼 SKD61 equivalent+Nitrided

🄷 Surface : 900HV
Base material : 40±3HRC

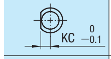
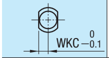
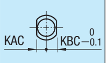
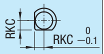
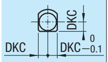
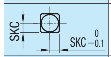
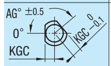
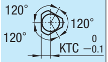
Range of guaranteed shaft diameter precision (D) (Details **P.1305**)
Range of guaranteed base material hardness (Details **P.1307**)
Range of guaranteed surface hardness for nitriding (Details **P.1308**)
Step R (Details **P.1306**)
Range of guaranteed tip-diameter precision (b_2) (Details **P.1306**)

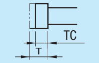
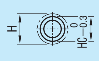
Nitriding may extend to the head as it is applied after dimension V and P machining.
To insert a stepped center pin, the following condition must be met:
the sleeve's recess diameter (C)≧the center pin's shaft diameter(D)+1.0 (Details **P.1310**)

Alterations

☎ Part Number — L — V — P — C — N — S — (KC・WKC…etc.)
ESNVF6 — 150.00 — V2.5 — P5.50 — C3.1 — N80 — S30 — KC3.5
ESJVF6 — 150.00 — V3.0 — P5.50 — C4.0 — N80 — S30 — KC3.5

Alteration details P.275

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T, T−TC≦Lmax.−L Dimensions L,N and (L−S) remain unchanged. TC tolerance is the same as T dimension tolerance.	Quotation
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

Non JIS material definition is listed on P.1351 - 1352

■4mm head

H	T	Part Number Type	D	L 0.01mm increments	V 0.1mm increments	P 0.01mm increments	C 0.1mm increments	Cmax.	1mm increments N	S
7	4	ESNVF	4	50.00~200.00	1.5~2.0	3.00~3.95	C≧V+0.5 and C≦P−1.0	2.5	N≧ $\frac{L}{3}$ and (L−N)≧10	20~50 L / (L−S)min. 50.00~60.00 / 20 60.01~ / 30
8			4.5		2.0~2.5	3.50~4.45		3.0		
			5	50.00~250.00	2.0~3.0	3.50~4.95		3.5		
9			5.5		2.0~3.5	3.50~5.45		4.0		
			6	50.00~300.00	2.0~4.0	4.00~5.95		4.5		
10			6.5		2.0~4.5	4.00~6.45		5.0		
			7		2.0~5.0	4.00~6.95		5.5		
11			7.5		2.0~5.5	4.00~7.45		6.0		
			8		2.5~6.0	4.00~7.95		6.5		20~50 L / (L−S)min. 50.00~60.00 / 20 60.01~70.00 / 30 70.01~80.00 / 40 80.01~ / 50
14			9		2.5~6.9	4.50~8.95		7.5		
15			10		2.5~7.9	4.50~9.95	C≧V+0.5 and C≦P−1.5	8.5		

D	Limit value for P
4~ 8	P≧V+1.5
9~10	P≧V+2.0

■JIS head

H	T	Part Number Type	D	L 0.01mm increments	V 0.1mm increments	P 0.01mm increments	C 0.1mm increments	Cmax.	N 1mm increments	S 5mm increments
9	6	ESJVF	5	50.00~300.00	2.0~3.0	3.50~4.95	C≧V+0.5 and C≦P−1.0	3.5	N≧ $\frac{L}{3}$ and (L−N)≧10	20~50 L / (L−S)min. 50.00~60.00 / 20 60.01~ / 30
			5.5		2.0~3.5	3.50~5.45		4.0		
10			6		2.0~4.0	4.00~5.95		4.5		
11			6.5		2.0~4.5	4.00~6.45		5.0		
			7			4.00~6.95		5.0		
12			7.5		2.0~5.0	4.00~7.45		5.5		
13	8		8	70.00~300.00	2.5~5.5	5.00~7.95		6.0		20~50 (L−S)≧50
14			9		3.0~6.5	6.00~8.95		7.0		
15			10		3.5~7.5	6.00~9.95	C≧V+0.5 and C≦P−1.5	8.0		

D	Limit value for P
5~ 8	P≧V+1.5
9~10	P≧V+2.0

Order

Part Number — L — V — P — C — N — S
ESNVF8 — 200.05 — V4.0 — P7.05 — C4.5 — N120 — S30
ESJVF10 — 200.05 — V4.5 — P7.55 — C6.0 — N120 — S30

Days to Ship Quotation

Price Quotation

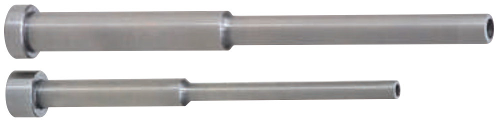
SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm Head・JIS

STEPPED EJECTOR SLEEVE

— STANDARD —

Non JIS material definition is listed on P.1351 - 1352

RoHS

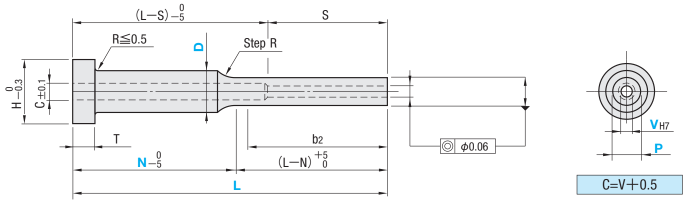


Part Number	Head Thickness (T)	T P	T D	T T	T V	T L	Applicable center pin shaft diameter tolerance
ESNFT	4mm (T4)	$^{-0.01}_{-0.02}$	$^{-0.01}_{-0.02}$	$^{0}_{-0.02}$	H7	$^{+5}_{+0.1}$	$^{-0.01}_{-0.02}$
ESJFT	8mm (JIS)	• P≦12.00 $^{-0.01}_{-0.02}$ • P>12.00 $^{-0.01}_{-0.03}$	$^{-0.02}_{-0.04}$	$^{0}_{-0.05}$			

※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

T VH7

V≦3.0	3.5≦V≦6.0	8.0≦V≦9.0	V≧11.0
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$	$^{+0.018}_{0}$



C=V+0.5

M SKD61 equivalent+Nitrided

H Surface : 900HV
Base material : 40±3HRC

Range of guaranteed shaft diameter precision (D) (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)
Step R (Details P.1306)
Range of guaranteed tip-diameter precision (b_2) (Details P.1306)

L	125	150	175	200	225	250	275	300
S	50 (V1.5 ···› 40)		60	80	100			

Note that the stepped center pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

■4mm head

H	T	Part Number Type	D	L	V	P	N
7	4	ESNFT	4	125	1.5	3.0 3.5	50 60
					2.0	3.5	
				150	1.5	3.0 3.5	60 80
					2.0	3.5	
8			5	125	2.0	3.5 4.0	50 60
					2.5	4.0	
				150	2.0	3.5 4.0	60 80
					2.5	4.0	
9			6	150	2.0	4.0	60 80
				175 200	2.5	4.0	60 80
					3.5	5.0	
				225 250	2.0	4.0	80 100
					2.5	4.5 5.0	
					3.0	4.5 5.0	
11			8	150	3.5	5.0 5.5	60 80
					4.5	6.0	
				175 200	2.5	4.0	80 100
					4.0	5.5 6.5	
				225 250	3.5	6.5	80 100

■8mm Head (JIS)

H	T	P	Part Number Type	D	L	V	N
13	8	V+2.0	ESJFT	8	125	3.0 3.5 4.0 4.5	50 60
					150		60 80 100
					175		80 100 120
					200		80 100 120
					225		100 120
					250		100 120 150
17		V+2.5		12	150	5.0 5.5	60 80 100
					175		80 100 120
					200		80 100 120
					225		100 120 150
					250		100 120 150
					275		120 150
					300		120 150
20		V+4.0		15	200	6.0 8.0 9.0	80 100 120
					225		100 120
					250		100 120 150
					275		120 150
					300		120 150
25				20	200	11.0 12.0 15.0	80 100 120
					225		100 120
					250		100 120 150
					275		120 150
					300		120 150

Order

Part Number	—	L	—	V	—	P	—	N
ESNFT6	—	200	—	V2.5	—	P4.0	—	N60
ESJFT8	—	200	—	V3.0			—	N80

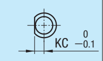
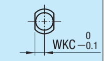
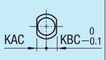
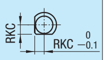
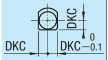
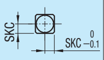
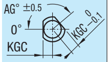
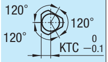
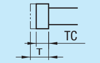
Days to Ship Quotation

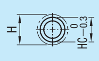
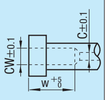
Price Quotation

Alterations

Part Number	—	L	—	V	—	P	—	N	—	(KC・WKC···etc.)
ESNFT6	—	200	—	V2.5	—	P4.0	—	N60	—	KC3.0
ESJFT8	—	200	—	V3.0			—	N80	—	KC4.0

Alteration details P.275

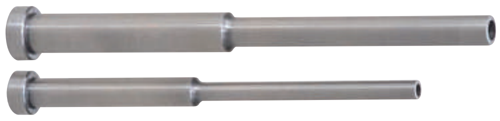
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.5mm increments The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	TC	TC=0.1mm increments T/2≦TC<T, T−TC≦Lmax.−L Dimensions L, N and (L−S) remain unchanged. TC tolerance is the same as T dimension tolerance.		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	CW	Two-step recessing (Makes recess C into two-steps and widens it) CW=0.1mm increments W=5mm increments C+0.5≦CW≦C max. ESJFT CW≦13.5 10≦W≦L−S−10 W≦N−20, W≦200	

SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm Head・JIS

STEPPED EJECTOR SLEEVE

— L DIMENSION DESIGNATION TYPE —

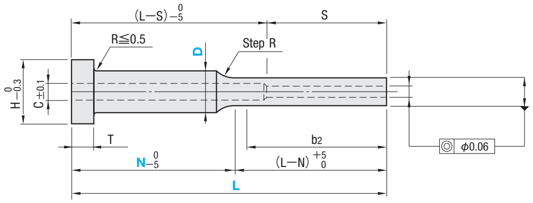


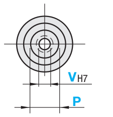
Part Number	Head Thickness (T)	T P	T D	T T	T V	T L L≦200	T L L>200	Applicable center pin shaft diameter tolerance
ESNF−LC	4mm (T4)	−0.01 −0.02	−0.01 −0.02	0 −0.02	H7	+0.02 0	+0.05 0	−0.01 −0.02
ESJF−LC	8mm (JIS)	・P≦12.00 −0.01 −0.02 ・P>12.00 −0.01 −0.03	−0.02 −0.04	0 −0.05				

※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{\ 0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)

T VH7

V≦3.0	3.5≦V≦6.0	8.0≦V≦9.0	V≧11.0
+0.010 0	+0.012 0	+0.015 0	+0.018 0





C=V+0.5

L	L100.00 ~125.00	L125.01 ~150.00	L150.01 ~175.00	L175.01 ~200.00	L200.01 ~225.00	L225.01 ~250.00	L250.01 ~275.00	L275.01 ~300.00
(L−S)	75 (V1.5 ···▸ 85)	100 (V1.5 ···▸ 110)	115	120	125	150	175	200

Note that the stepped center pin's shaft diameter (D) is too large to fit in the recess (C). (Details P.1310)

M SKD61 equivalent+Nitrided

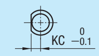
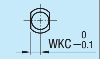
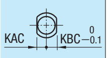
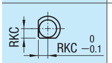
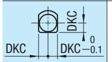
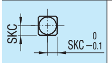
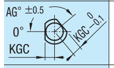
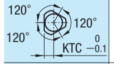
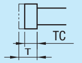
H Surface : 900HV
Base material : 40±3HRC

Range of guaranteed shaft diameter precision (D) (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)
Step R (Details P.1306)
Range of guaranteed tip-diameter precision (b2) (Details P.1306)

Alterations

Part Number	—	L	—	V	—	P	—	N	—	(KC・WKC···etc.)
ESNF−LC6	—	200.00	—	V2.5	—	P4.0	—	N60	—	KC3.0
ESJF−LC8	—	200.00	—	V3.0			—	N80	—	WKC4.0

Alteration details P.275

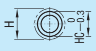
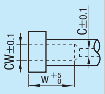
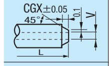
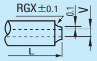
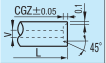
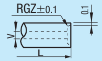
Alterations	Code	Spec.	1Code
	KC	Single flat cutting $D/2\leqq KC<H/2$	Quotation
	WKC	Two flats cutting $D/2\leqq WKC<H/2$	
	KAC KBC	Varied width parallel flats cutting $D/2\leqq KAC<H/2$ KBC=0.1mm increments only $KAC<KBC<H/2$	
	RKC	Two flats (right angled) cutting $D/2\leqq RKC<H/2$	
	DKC	Three flats cutting $D/2\leqq DKC<H/2$	
	SKC	Four flats cutting $D/2\leqq SKC<H/2$	
	KGC	Two flats (angled) cutting $D/2\leqq KGC<H/2$ AG=1° increments $0<AG<360$	
	KTC	Three flats cutting at 120° $D/2\leqq KTC<H/2$	
	TC	TC=0.1mm increments $T/2\leqq TC<T,\ T-TC\leqq L\text{max.}-L$ Dimensions L, N and (L−S) remain unchanged. TC tolerance is the same as T dimension tolerance.	

About Designation Unit and Tolerance for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.5mm increments

The tolerance is $^{\ 0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter.

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments $D\leqq HC<H$ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	CW	Two-step recessing (Makes recess C into two-steps and widens it) CW=0.1mm increments W=5mm increments $C+0.5\leqq CW\leqq C$ max. ESJF−LC $CW\leqq 13.5$ $10\leqq W\leqq L-S-10$ $W\leqq N-20,\ W\leqq 200$	Quotation
	CGX	CGX=0.1mm increments $0.2\leqq CGX\leqq 1.5$ and $CGX\leqq \frac{P-V}{2}-0.1$ Available when $L-N\geqq 50$ ⊗ Combination with RGX/CGZ/RGZ not available.	
	RGX	RGX=0.1mm increments $0.3\leqq RGX\leqq 1.5$ and $RGX\leqq \frac{P-V}{2}-0.1$ Available when $L-N\geqq 50$ ⊗ Combination with CGX/CGZ/RGZ not available.	
	CGZ	CGZ=0.1mm increments $0.2\leqq CGZ\leqq 1.0$ and $CGZ\leqq \frac{P-V}{2}-0.1$ Available when $L-N\geqq 50$ ⊗ Combination with CGX/RGX/RGZ not available.	
	RGZ	RGZ=0.1mm increments $0.5\leqq RGZ\leqq 1.0$ and $RGZ\leqq \frac{P-V}{2}-0.1$ Available when $L-N\geqq 50$ ⊗ Combination with CGX/RGX/CGZ not available.	

Non JIS material definition is listed on P.1351 - 1352

■4mm head

H	T	Part Number Type	Part Number D	L 0.01mm increments	V	P	N
7	4	ESNF−LC	4	100.00~125.00	1.5	3.0 3.5	50 60
					2.0	3.5	
				125.01~150.00	1.5	3.0 3.5	60 80
					2.0	3.5	
8			5	100.00~125.00	2.0	3.5 4.0	50 60
					2.5	4.0	
				125.01~150.00	2.0	3.5 4.0	60 80
					2.5	4.0	
9			6	100.00~150.00	2.0	4.0	60 80
				150.01~200.00	2.5	4.0	60 80
					3.5	5.0	
				200.01~250.00	2.0	4.0	80 100
					2.5	4.5 5.0	
					3.0	4.5 5.0	
11			8	100.00~150.00	3.5	5.0 5.5	60 80
					4.5	6.0	
				150.01~200.00	2.5	4.0	80 100
					4.0	5.5 6.5	
				200.01~250.00	3.5	6.5	80 100

■8mm Head (JIS)

H	T	P	Part Number Type	Part Number D	L 0.01mm increments	V	N
13	8	V+2.0	ESJF−LC	8	100.00~125.00	3.0 3.5 4.0 4.5	50 60
					125.01~150.00		60 80 100
					150.01~175.00		80 100 120
					175.01~200.00		80 100 120
					200.01~225.00		100 120
					225.01~250.00		100 120 150
17		V+2.5		12	125.00~150.00	5.0 5.5	60 80 100
					150.01~175.00		80 100 120
					175.01~200.00		80 100 120
					200.01~225.00		100 120 150
					225.01~250.00		100 120 150
					250.01~275.00		120 150
					275.01~300.00		120 150
20		V+4.0		15	175.00~200.00	6.0 8.0 9.0	80 100 120
					200.01~225.00		100 120
					225.01~250.00		100 120 150
					250.01~275.00		120 150
					275.01~300.00		120 150
25				20	175.00~200.00	11.0 12.0 15.0	80 100 120
					200.01~225.00		100 120
					225.01~250.00		100 120 150
					250.01~275.00		120 150
					275.01~300.00		120 150

Order

Part Number	—	L	—	V	—	P	—	N
ESNF−LC6	—	152.00	—	V2.5	—	P4.0	—	N60
ESJF−LC8	—	200.00	—	V3.0			—	N80

Days to Ship Quotation

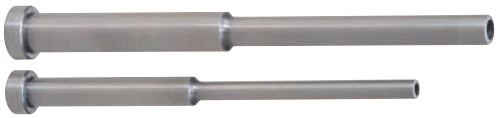
Price Quotation

SKD61 equivalent+Nitrided
Concentricity◎0.06
4mm head

STEPPED EJECTOR SLEEVE

—L · V dimension designation type—

❗ Non JIS material definition is listed on P.1351 - 1352

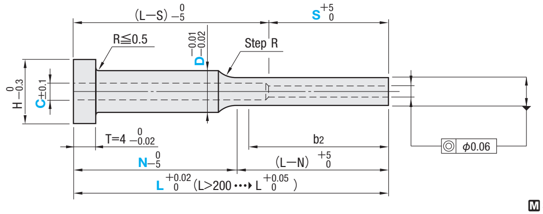


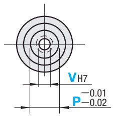
RoHS

Part Number	T P	T V	Applicable center pin shaft diameter tolerance	
ESNF	$^{-0.01}_{-0.02}$	H7	$^{-0.01}_{-0.02}$	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details ☞ P.1309)

T V_{H7}

V≦3.0	3.1≦V≦6.0	6.1≦V≦10.0	V≧10.1
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$	$^{+0.018}_{0}$





C=designated dimension

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

❗ Range of guaranteed shaft diameter precision (D) (Details ☞ P.1305)
Range of guaranteed base material hardness (Details ☞ P.1307)
Range of guaranteed surface hardness for nitriding (Details ☞ P.1308)
Step R (Details ☞ P.1306)
❗ Range of guaranteed tip-diameter precision (b2) (Details ☞ P.1306)

❗ Nitriding may extend to the head as it is applied after dimension V and P machining.
❗ To insert a stepped center pin, the following condition must be met:
the sleeve's recess diameter (C)≧the center pin's shaft diameter(D)+1.0 (Details ☞ P.1310)

H	Part Number Type	Part Number D	L 0.01mm increments	V 0.1mm increments	❗ P 0.01mm increments	C 0.1mm increments	Cmax.	1mm increments N	1mm increments S
7	**ESNF**	4	50.00~200.00	1.5~ 2.0	3.00~ 3.95	C≧V+0.5 and C≦P−1.0	2.5	N≧$\frac{L}{3}$ and (L−N)≧10	20~100 L 50.00~60.00: (L−S)min. 20 L 60.01~: (L−S)min. 30
8		4.5		2.0~ 2.5	3.50~ 4.45		3.0		
		5	50.00~250.00	2.0~ 3.0	3.50~ 4.95		3.5		
9		5.5		2.0~ 3.5	3.50~ 5.45		4.0		
		6	50.00~300.00	2.0~ 4.0	4.00~ 5.95		4.5		
10		6.5		2.0~ 4.5	4.00~ 6.45		5.0		
		7		2.0~ 5.0	4.00~ 6.95		5.5		
11		7.5		2.0~ 5.5	4.00~ 7.45		6.0		
		8		2.5~ 6.0	4.00~ 7.95		6.5		20~100 L 50.00~60.00: (L−S)min. 20 L 60.01~70.00: (L−S)min. 30 L 70.01~80.00: (L−S)min. 40 L 80.01~: (L−S)min. 50
14		9		2.5~ 6.9	4.50~ 8.95		7.5		
15		10		2.5~ 7.9	4.50~ 9.95	C≧V+0.5 and C≦P−1.5	8.5		
18		13		2.5~10.9	5.00~12.95		11.5		
21		16		2.5~13.0	7.00~15.95		14.5		

❗

D	Limit value for P
4~ 8	P≧V+1.5
9~16	P≧V+2.0

Order

Part Number	—	L	—	V	—	P	—	C	—	N	—	S
ESNF8	—	200.05	—	V4.0	—	P7.05	—	C4.5	—	N120	—	S85

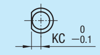
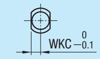
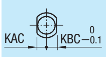
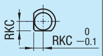
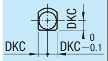
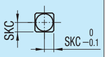
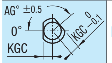
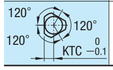
Days to Ship Quotation

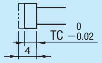
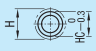
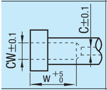
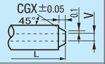
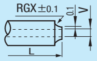
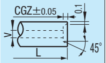
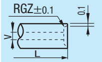
Price Quotation

Alterations

Part Number	—	L	—	V	—	P	—	C	—	N	—	S	—	(KC · WKC···etc.)
ESNF6	—	150.00	—	V2.5	—	P5.50	—	C3.1	—	N80	—	S85	—	KC3.5

Alteration details ☞ P.275

Alterations	Code	Spec.		1Code
 KC $^{0}_{-0.1}$	**KC**	Single flat cutting D/2≦KC<H/2	About Designation Unit and Tolerance for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible ❗ The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter. (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC $^{0}_{-0.1}$	**WKC**	Two flats cutting D/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.1}$	**KAC** **KBC**	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.1}$	**RKC**	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	**DKC**	Three flats cutting D/2≦DKC<H/2		
 SKC SKC $^{0}_{-0.1}$	**SKC**	Four flats cutting D/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	**KGC**	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	**KTC**	Three flats cutting at 120° D/2≦KTC<H/2		

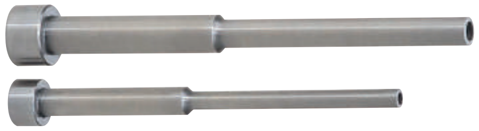
Alterations	Code	Spec.	1Code
 TC $^{0}_{-0.02}$ 4	**TC**	TC=0.1mm increments ❗ 2.0≦TC<4.0,4−TC≦Lmax.−L ❗ Dimensions L, N and (L−S) remain unchanged.	Quotation
 H HC $^{0}_{-0.3}$	**HC**	HC=0.1mm increments ❗ D≦HC<H ❗ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 CW±0.1 C±0.1 W $^{+5}_{0}$	**CW**	Two-step recessing (Makes recess C into two-steps and widens it) CW=0.1mm increments W=5mm increments ❗ C+0.5≦CW≦C max. ❗ 10≦W≦L−S−10 ❗ W≦N−20, W≦200	
 CGX±0.05 45° 0.1 V L	**CGX**	CGX=0.1mm increments ❗ 0.2≦CGX≦1.5 and CGX≦$\frac{P-V}{2}$−0.1 ❗ Available when L−N≧50 ⊗ Combination with RGX/CGZ/RGZ not available.	
 RGX±0.1 0.1 V L	**RGX**	RGX=0.1mm increments ❗ 0.3≦RGX≦1.5 and RGX≦$\frac{P-V}{2}$−0.1 ❗ Available when L−N≧50 ⊗ Combination with CGX/CGZ/RGZ not available.	
 CGZ±0.05 0.1 V L 45°	**CGZ**	CGZ=0.1mm increments ❗ 0.2≦CGZ≦1.0 and CGZ≦$\frac{P-V}{2}$−0.1 ❗ Available when L−N≧50 ⊗ Combination with CGX/RGX/RGZ not available.	
 RGZ±0.1 0.1 V L	**RGZ**	RGZ=0.1mm increments ❗ 0.5≦RGZ≦1.0 and RGZ≦$\frac{P-V}{2}$−0.1 ❗ Available when L−N≧50 ⊗ Combination with CGX/RGX/CGZ not available.	

SKD61 equivalent+Nitrided
Concentricity◎0.06
JIS head

STEPPED EJECTOR SLEEVE

—L · V dimension designation type—

Non JIS material definition is listed on P.1351 - 1352

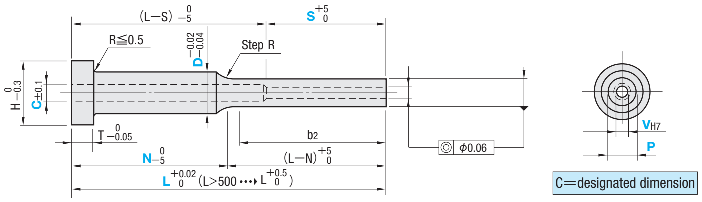


RoHS

Part Number	P	T P	T V	Applicable center pin shaft diameter tolerance	
ESJF	P≦12.00	$^{-0.01}_{-0.02}$	H7	$^{-0.01}_{-0.02}$	※Note that for sleeves with V dimension tolerance of H7, combination with center pins that have shaft diameter tolerance $^{0}_{-0.005}$ is not recommended. The reason for this is the fitting sections S are longer. (Details P.1309)
	P>12.00	$^{-0.01}_{-0.03}$			

T V_{H7}

V≦3.0	3.1≦V≦6.0	6.1≦V≦10.0	V≧10.1
$^{+0.010}_{0}$	$^{+0.012}_{0}$	$^{+0.015}_{0}$	$^{+0.018}_{0}$



C=designated dimension

M SKD61 equivalent+Nitrided
H Surface : 900HV
Base material : 40±3HRC

Range of guaranteed shaft diameter precision (D) (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)
Step R (Details P.1306)
Range of guaranteed tip-diameter precision (b2) (Details P.1306)

Nitriding may extend to the head as it is applied after dimension V and P machining.
To insert a stepped center pin, the following condition must be met:
the sleeve's recess diameter (C)≧the center pin's shaft diameter(D)+1.0 (Details P.1310)

H	T	Part Number Type	D	L 0.01mm increments	L 0.1mm increments	V 0.1mm increments	P 0.01mm increments	C 0.1mm increments	Cmax.	N 1mm increments	S 5mm increments
9	6	**ESJF**	5	50.00~300.00	—	2.0~ 3.0	3.50~ 4.95	C≧V+0.5 and C≦P−1.0 (When L>300 0.5mm increments)	3.5	$N \geq \frac{L}{3}$	20~100 L | (L−S)min. 50.00~60.00 | 20 60.01~ | 30
			5.5			2.0~ 3.5	3.50~ 5.45		4.0		
10			6	50.00~500.00		2.0~ 4.0	4.00~ 5.95		4.5		
11			6.5			2.0~ 4.5	4.00~ 6.45		5.0		
			7				4.00~ 6.95		5.0		
12			7.5			2.0~ 5.0	4.00~ 7.45		5.5		
13	8		8	70.00~500.00		2.5~ 5.5	5.00~ 7.95		6.0		20~100 (L−S)≧50
14			9			3.0~ 6.5	6.00~ 8.95		7.0	(When L>600 $\frac{L}{3} \leq N \leq \frac{2}{3}L$)	
15			10		500.1~600.0	3.5~ 7.5	6.00~ 9.95	C≧V+0.5 and C≦P−1.5 (When L>300 0.5mm increments)	8.0		
17			12	70.00~500.00	500.1~800.0	4.0~ 8.5	7.50~11.95		9.0		
20			15			5.0~10.5	10.00~14.95		11.0		
21			16	100.00~500.00		5.0~11.5	12.00~15.95		12.0		
25			20			7.0~16.0	14.50~19.95		17.0		

Limit value of P and V

L \ D	5 · 5.5	6~7	7.5 · 8	9~20
L≦300	P≧V+1.5	P≧V+1.5	P≧V+1.5	P≧V+2
L>300 and (L−N−10)≦S	—	P≧V+3	P≧V+4	P≧V+4.5
L>300 and (L−N−10)>S	—	P≧(V+3) and (P−C)/2 ≧0.75	P≧(V+4) and (P−C)/2≧0.75	P≧(V+4.5) and (P−C)/2≧0.75

Order

Part Number	—	L	—	V	—	P	—	C	—	N	—	S
ESJF12	—	200.05	—	V4.5	—	P7.55	—	C6.0	—	N120	—	S85

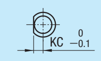
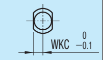
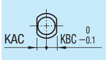
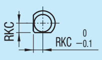
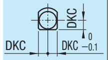
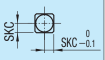
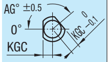
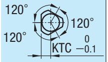
Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	L	—	V	—	P	—	C	—	N	—	S	—	(KC · WKC···etc.)
ESJF6	—	150.00	—	V3.0	—	P5.50	—	C4.0	—	N80	—	S85	—	KC3.5

Alteration details P.275

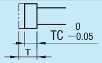
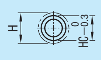
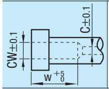
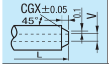
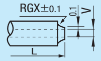
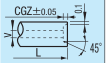
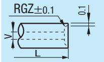
Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit and Tolerance for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

The tolerance is $^{0}_{-0.1}$ even when D/2 is designated to fit to the shaft diameter.

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

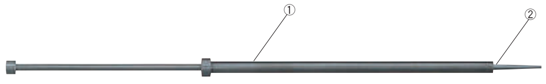
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T, T−TC≦Lmax.−L Dimensions L, N and (L−S) remain unchanged.	Quotation
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	CW	Two-step recessing (Makes recess C into two-steps and widens it) CW=0.1mm increments W=5mm increments C+0.5≦CW≦C max. CW≦13.5 10≦W≦L−S−10 W≦N−20, W≦200	
	CGX	CGX=0.1mm increments $0.2 \leq CGX \leq 1.5$ and $CGX \leq \frac{P-V}{2} - 0.1$ L−N≧50, Available when L≦300 ⊗ Combination with RGX/CGZ/RGZ not available.	
	RGX	RGX=0.1mm increments $0.3 \leq RGX \leq 1.5$ and $RGX \leq \frac{P-V}{2} - 0.1$ L−N≧50, Available when L≦300 ⊗ Combination with CGX/CGZ/RGZ not available.	
	CGZ	CGZ=0.1mm increments $0.2 \leq CGZ \leq 1.0$ and $CGZ \leq \frac{P-V}{2} - 0.1$ L−N≧50, Available when L≦300 ⊗ Combination with CGX/RGX/RGZ not available.	
	RGZ	RGZ=0.1mm increments $0.5 \leq RGZ \leq 1.0$ and $RGZ \leq \frac{P-V}{2} - 0.1$ L−N≧50, Available when L≦300 ⊗ Combination with CGX/RGX/CGZ not available.	

High Speed Steel
SKH51 equivalent

STRAIGHT EJECTOR SLEEVE & ONE-STEP CENTER PIN SETS

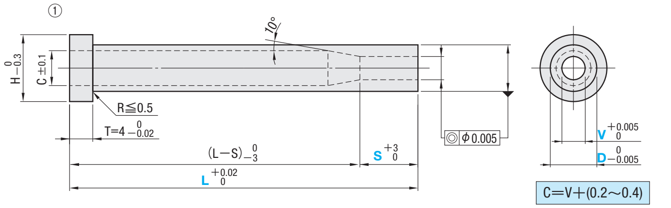
—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

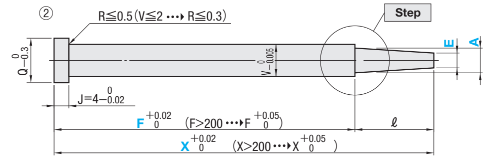


RoHS

Part Number	Ejector Sleeve Head Thickness (T)	Center Pin Head Thickness (J)	T Head Thickness (T・J)
ESV—S—□	4mm	4mm	$^{0}_{-0.02}$



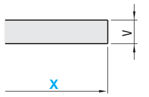
C=V+(0.2~0.4)


②
R≦0.5 (V≦2 ···▸ R≦0.3)
Step
Q $^{0}_{-0.3}$
V $^{0}_{-0.005}$
E
A
J=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···▸ F $^{+0.05}_{0}$)
ℓ
X $^{+0.02}_{0}$ (X>200 ···▸ X $^{+0.05}_{0}$)

Head diameter of center pin	
V	Q
1	3
1.5	
2	4
2.5	5
3	6
3.5	7
4	
4.5	8
5	
5.5	9
6	
6.5	10
7	
8	11
9	14
10	15
12	17

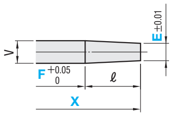
①② M SKH51 equivalent
H 58~60HRC
Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)

Step S (Not processed)



Alteration CX Designate in 0.3≦CX≦0.5, CX<V/2
Alteration RX Designate in 0.3≦RX≦0.5~1.0, RX<V/2
Alteration SR SR=V/2

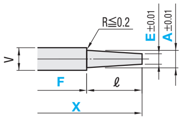
Step A



ℓ≧0.5+α

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

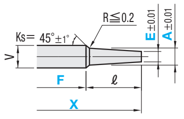
Step B



ℓ≧0.7+α

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

Step C



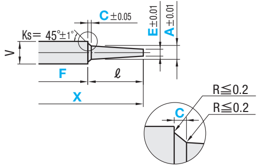
$\ell \geqq \frac{V-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{V-A}{2\tan AC}+0.5+\alpha$

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

Step D



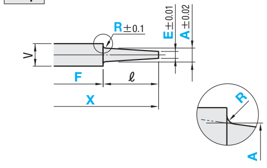
0.1≦C≦1.5

$C < \frac{V-A}{2}$

ℓ≧C+0.5+α

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

Step E



$0.3 \leqq R \leqq \frac{V-A}{2}$

ℓ≧R+0.5+α

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

H	Part Number			L	V		S	0.01mm increments				0.1mm increments	ℓmax.
	Type	Step	D	0.01mm increments	0.5mm increments	1mm increments	0.5mm increments	X	F	A	Emin.	C・R	
7	ESV—S—	S A B C D E	4	50.00~120.00	1*~2.5	—	1.0≦S≦(V×3) and S≦25	L+20≦X≦L+100 and X≦Xmax.	F≧50.00 No need to designate F when Step S is selected.	V>A≧E No need to designate A・E when Step S is selected. No need to designate A when Step A is selected.	see table	Step D only 0.1≦C≦1.5 and $C<\frac{V-A}{2}$ Step E only R≧0.3 and $R<\frac{V-A}{2}$	see table
8			5	50.00~150.00	1*~3.5								
9			6		2~4.5								
10			7		3~5.5								
11			8	50.00~200.00	4~6								
14			9		5~7								
15			10		6~7	8							
16			11		—	7~ 9							
17			12			7~10							
18			13										
19			14			7~10・12							

V	Xmax.
1	150.00
1.5	200.00
2~	250.00

V	Emin.
1	0.50
1.5	
2	0.70
2.5	
3	1.00
3.5	
4	
4.5	1.50
5	
5.5	2.00
6	
6.5	
7	
8	
9	
10	
12	

V	ℓmax.
1	15
1.5	20
2	25
2.5	30
3	35
3.5	40
4	45
4.5	50
5	
5.5	
6	
6.5	
7	
8	
9	
10	
12	

1* ···· Step E is V≧1.5   Refer to the drawing for ℓ min. (normally, α=0)

Order

Part Number	—	L	—	V	—	S	—	X	—	F	—	A	—	E	—	C・R
ESV—S—D6	—	145.50	—	V3.0	—	S8	—	X220.00	—	F200.00	—	A2.50	—	E1.50	—	C0.4

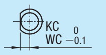
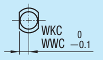
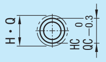
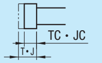
Days to Ship Quotation

Price Quotation

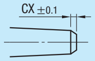
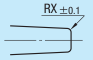
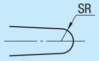
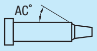
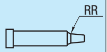
Alterations

Part Number	—	L	—	V	—	S	—	X	—	F	—	A	—	E	—	C・R	—	(KC・WKC···etc.)
ESV—S—D6	—	145.50	—	V3.0	—	S8	—	X220.00	—	F200.00	—	A2.50	—	E1.50	—	C0.4	—	HC10—WC1.75

Alteration details P.275

Alterations	Code	Spec.	1Code
	KC WC	KC・WC=0.1mm increments KC=D/2 ···▸ 0.05mm increments possible WC=V/2 ···▸ 0.05mm increments possible D/2≦KC<H/2, V/2≦WC<Q/2	Quotation
	WKC WWC	WKC・WWC=0.1mm increments WKC=D/2 ···▸ 0.05mm increments possible WWC=V/2 ···▸ 0.05mm increments possible D/2≦WKC<H/2, V/2≦WWC<Q/2	
	HC QC	HC・QC=0.1mm increments D≦HC<H, V≦QC<Q In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	TC JC	TC・JC=0.1mm increments (Dimensions L・X and F remain unchanged.) T/2≦TC<T, T−TC≦Lmax.−L J/2≦JC<J, J−JC≦Xmax.−X	

① Alterations for Ejector Sleeves : KC, WKC, HC, TC
② Center pin alteration : WC, WWC, QC, JC, CX, RX, SR, AC, RR

Alterations	Code	Spec.	1Code
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<E (orV)/2 E (orV) is a dimension prior to CX machining. α=CX	Quotation
	RX	RX=0.1mm increments V≦4.5, 0.3≦RX≦0.5, RX<E (orV)/2 V>4.5, 0.3≦RX≦1.0 E (orV) is a dimension prior to RX machining. α=RX	
	SR	Finishes the tip in spherical shape (SR). α=E (orV)/2 X is $^{+0.05}_{0}$ E (orV) is a dimension prior to SR machining.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C/D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<V	
	RR	Changes R (normally 0.2 or less) to R0.3~0.5. (for Strength improvement) Designation method RR Available for Step B, C, D V−A≧1.0 When Step D, C≧0.5	

CX, RX, SR are available when V≧2

Dies Steel
SKD61 equivalent
+
Nitrided

STRAIGHT EJECTOR SLEEVE & ONE-STEP CENTER PIN SETS

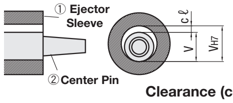
—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

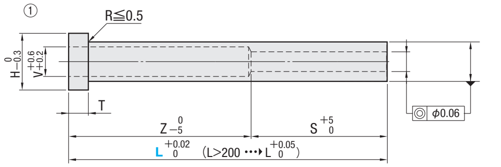
RoHS

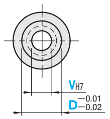
Part Number	Head Thickness (T・J)	T Head Thickness (T・J) L≦300	T Head Thickness (T・J) L>300
ESNS−□	4mm (T4)	$^{0}_{-0.02}$	$^{0}_{-0.05}$
ESJS−□	4・6・8mm (JIS)	$^{0}_{-0.05}$	

Clearance (cℓ) between the ejector sleeve's internal diameter (VH7) and the center pin's shaft diameter (V).



Clearance (cℓ)<0.03





T VH7dimension tolerance

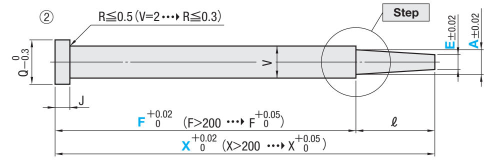
V	
1.5～3.0	$^{+0.010}_{0}$
3.5～6.0	$^{+0.012}_{0}$
6.5～8.5	$^{+0.015}_{0}$

Head diameter/thickness of center pin

V	4mm head Q	4mm head J	JIS head Q	JIS head J
1.5	3	4	3	4
2.0	4		4	
2.5	5		5	
3.0	6		6	
3.5	7		7	
4.0			8	6
4.5	8			
5.0			9	
5.5	9			
6.0			10	
6.5	10		11	
8.0	11		13	8
8.5	13		14	

S dimension depends on the designated L dimension.
S=L−Z

L	80.00～100.00	100.01～120.00	120.01～140.00	140.01～160.00	160.01～180.00	180.01～225.00	225.01～250.00	250.01～275.00	275.01～300.00	300.01～325.00	325.01～350.00	350.01～375.00	375.01～400.00
Z	50	70	90	85	105	125	150	175	185	210	235	225	250



②
R≦0.5 (V=2 ···› R≦0.3)
Step
Q−0.3 0
V
E±0.02
A±0.02
J
F +0.02 0 (F>200 ···› F +0.05 0)
ℓ
X +0.02 0 (X>200 ···› X +0.05 0)

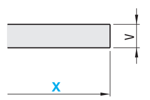
Default α = 0
When CX code is used α = CX
When RX code is used α = RX
When SR code is used α = E/2

① M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40±3HRC

② M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40～45HRC

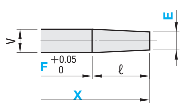
Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)
No nitriding on the tip (ℓ) of center pin.

Step S (Not processed)



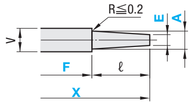
Alteration CX Designate in 0.3 ≦ CX ≦ 0.5, CX < V/2
Alteration RX Designate in 0.3 ≦ RX ≦ 0.5 ～ 1.0, RX < V/2
Alteration SR SR = V/2

Step A



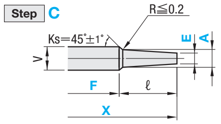
ℓ≧0.5+α

Step B



ℓ≧0.7+α

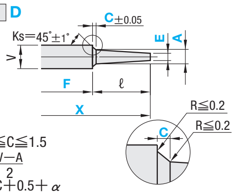
Step C



$ℓ≧\frac{V-A}{2}+0.5+α$

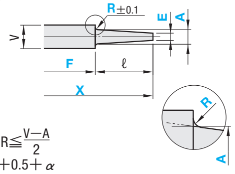
When AC code is used $ℓ≧\frac{V-A}{2\tan AC}+0.5+α$

Step D



0.1≦C≦1.5
$C<\frac{V-A}{2}$
ℓ≧C+0.5+α

Step E



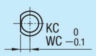
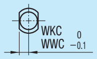
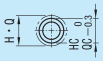
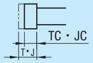
$0.3≦R≦\frac{V-A}{2}$
ℓ≧R+0.5+α

Ejector Sleeve 4mm head H	Ejector Sleeve 4mm head T	Ejector Sleeve JIS head H	Ejector Sleeve JIS head T	Part Number Type	Part Number Step	Part Number D	L 0.01mm increments	V	0.01mm increments X	0.01mm increments F	0.01mm increments A	0.01mm increments Emin.	0.1mm increments C・R	ℓ max.
7	4	8	6	ESNS− (4mm head) ESJS− (JIS Head)	S A B C D E	4	80.00～160.00	1.5 2.0 2.5	L+100≧X X≧L+20	F≧50.00 No need to designate F when Step S is selected.	V>A≧E No need to designate A・E when Step S is selected. No need to designate A when Step A is selected.	0.70	Step D only 0.1≦C≦1.5 and $C<\frac{V-A}{2}$	V×10 (V≧5.0 ···› ℓ max.=50)
							160.01～200.00	2.0						
8						4.5	80.00～160.00	1.5 2.0 2.5				1.00		
							160.01～200.00	2.0						
		9				5	80.00～225.00	2.0 2.5 3.0						
							225.01～275.00	3.0						
9						5.5	80.00～225.00	2.0 2.5 3.0						
							225.01～275.00	3.0						
		10				6	80.00～300.00	2.0 2.5 3.0 3.5 4.0						
							300.01～400.00	3.0 3.5						
10		11				6.5	80.00～300.00	2.0 2.5 3.0 3.5 4.0				1.50	Step E only R≧0.3 and $R≦\frac{V-A}{2}$	
							300.01～400.00	3.0 3.5 4.0						
						7	80.00～300.00	2.0 2.5 3.0 3.5 4.0 4.5						
							300.01～400.00	3.0 3.5 4.0 4.5						
11		12				7.5	80.00～300.00	3.0 3.5 4.0 4.5						
							300.01～325.00	4.0 4.5						
		13	8			8	80.00～275.00	2.0 2.5 3.0 3.5 4.0 4.5 5.0				2.00		
							275.01～400.00	3.0 3.5 4.0 4.5 5.0						
15		15				10	80.00～400.00	4.0 4.5 5.0 5.5 6.0 6.5						
17		17				12	80.00～400.00	4.0 4.5 5.0 5.5 6.0 6.5 8.0 8.5						

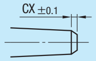
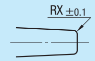
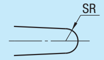
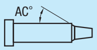
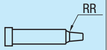
	Part Number	L	V	X	F	A	E	C(R)	
Order	ESNS−D8	300.00	V5.0	X390.00	F350.00	A2.50	E2.00	C1.0	Quotation
Alterations	ESNS−E10	310.00	V4.5	X400.00	F300.00	A3.20	E2.40	R0.3	(KC・WKC···etc.) HC13−WC6

Price Quotation

Alteration details P.275

Alterations	Code	Spec.	1Code
 KC WC $^{0}_{-0.1}$	KC WC	KC・WC=0.1mm increments KC=D/2 ···› 0.05mm increments possible WC=V/2 ···› 0.05mm increments possible D/2≦KC<H/2, V/2≦WC<Q/2	Quotation
 WKC WWC $^{0}_{-0.1}$	WKC WWC	WKC・WWC=0.1mm increments WKC=D/2 ···› 0.05mm increments possible WWC=V/2 ···› 0.05mm increments possible D/2≦WKC<H/2, V/2≦WWC<Q/2	
 H・Q HC QC $^{0}_{-0.3}$	HC QC	HC・QC=0.1mm increments D≦HC<H, V≦QC<Q In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 TC・JC T・J	TC JC	TC・JC=0.1mm increments (Dimensions L・X and F remain unchanged.) T/2≦TC<T, T−TC≦Lmax.−L J/2≦JC<J, J−JC≦Xmax.−X	

① Alterations for Ejector Sleeves : KC, WKC, HC, TC
② Center pin alteration : WC, WWC, QC, JC, CX, RX, SR, AC, RR

Alterations	Code	Spec.	1Code
 CX ±0.1	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<E (orV)/2 E (orV) is a dimension prior to CX machining. α=CX	Quotation
 RX ±0.1	RX	RX=0.1mm increments V≦4.5, 0.3≦RX≦0.5, RX<E (orV)/2 V>4.5, 0.3≦RX≦1.0 E (orV) is a dimension prior to RX machining. α=RX	
 SR	SR	Finishes the tip in spherical shape (SR). α=E (orV)/2 X is $^{+0.05}_{0}$ E (orV) is a dimension prior to SR machining.	
 AC°	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Step Available for C/D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<V	
 RR	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for Strength improvement) Designation method RR Available for Step B, C, D V−A≧1.0 When Step D, C≧0.5	

Dies Steel
SKD61 equivalent
+
Nitrided

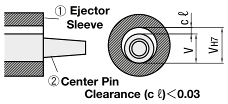
STRAIGHT EJECTOR SLEEVE & ONE-STEP CENTER PIN SETS

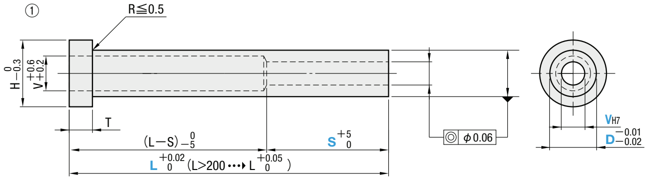
—HOLE (SHAFT) DIAMETER・L DIMENSION DESIGNATION TYPE—

RoHS

Part Number	Head Thickness (T·J)	T Head Thickness (T・J)
ESNP—□	4mm (T4)	0 —0.02
ESJP—□	4・6・8mm (JIS)	0 —0.05

Clearance (cℓ) between the ejector sleeve's internal diameter (V_{H7}) and the center pin's shaft diameter (V).



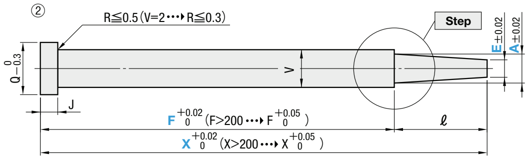


T V_{H7}dimension

V	tolerance
2.0～3.0	$^{+0.010}_{0}$
3.1～6.0	$^{+0.012}_{0}$
6.1～8.0	$^{+0.015}_{0}$

Head diameter/thickness of center pin

V	4mm head Q	4mm head J	JIS head Q	JIS head J
2.0	4	4	4	4
2.1～2.5	5		5	
2.6～3.0	6		6	
3.1～3.5	7		7	
3.6～3.9			8	6
4.0				
4.1～4.5	8			
4.6～4.9			9	
5.0				
5.1～5.5	9			
5.6～5.9			10	
6.0				
6.1～6.4	10		11	
6.5				
6.6～7.0				
7.1～7.5	11		13	
7.6～7.9				8
8.0				



Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

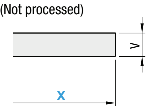
① M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40±3HRC

② M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40～45HRC

Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

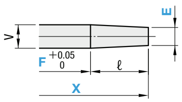
No nitriding on the tip (ℓ) of center pin.

Step S (Not processed)



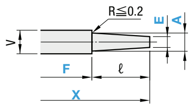
Alterations CX	0.3Designate in 0.3≦CX≦0.5, CX<V/2
Alterations RX	0.3Designate in 0.3 ≦ RX ≦ 0.5 ～ 1.0, RX < V/2
Alterations SR	SR=V/2

Step A



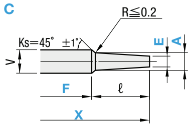
ℓ≧0.5+α

Step B



ℓ≧0.7+α

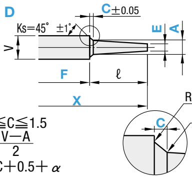
Step C



$\ell \geqq \frac{V-A}{2}+0.5+\alpha$

When AC code is used $\ell \geqq \frac{V-A}{2\tan AC}+0.5+\alpha$

Step D

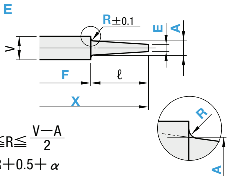


0.1≦C≦1.5

$C < \frac{V-A}{2}$

ℓ≧C+0.5+α

Step E



$0.3 \leqq R \leqq \frac{V-A}{2}$

ℓ≧R+0.5+α

Non JIS material definition is listed on P.1351 - 1352

Ejector Sleeve 4mm head H	Ejector Sleeve 4mm head T	Ejector Sleeve JIS head H	Ejector Sleeve JIS head T	Part Number Type	Part Number Step	Part Number D	L 0.01mm increments	V 0.1mm increments	S 1mm increments	X (0.01mm increments)	F (0.01mm increments)	A (0.01mm increments)	Emin. (0.01mm increments)	C・R (0.1mm increments)	ℓ max.
7	4	8	6	ESNP— (4mm head) ESJP— (JIS Head)	S A B C D E	4	50.00～200.00	2.0～2.5	20～100 L | (L—S) min. 50.00～60.00 | 20 60.01～ | 30	L+100≧X and X≧L+20	F≧50.00 No need to designate F when Step S is selected.	V>A≧E No need to designate A・E when Step S is selected. No need to designate A when Step A is selected.	0.70	Step D only 0.1≦C≦1.5 and $C<\frac{V-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{V-A}{2}$	V×10 (V≧5.0 ⋯ ℓ max.=50)
						4.5									
8		9				5	50.00～250.00	2.0～3.0					1.00		
9						5.5		2.0～3.5							
		10				6	80.00～300.00	2.5～4.0							
10		11				6.5		2.5～4.0							
						7		2.5～4.5					1.50		
11		12				7.5		2.5～4.5							
		13	8			8		2.5～5.5	30～100 L | (L—S) min. 80.00 | 40 80.01～ | 50				2.00		
15		15				10		4.0～7.0							
17		17				12		4.0～8.0							

Order

Part Number	—	L	—	V	—	S	—	X	—	F	—	A	—	E	—	C(R)
ESNP—E10	—	250.00	—	V6.5	—	S80	—	X350.00	—	F300.00	—	A4.20	—	E3.20	—	R0.5

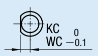
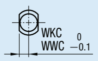
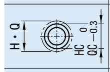
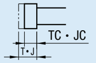
Days to Ship Quotation

Price Quotation

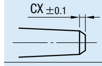
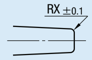
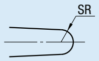
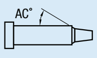
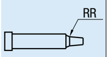
Alterations

Part Number	—	L	—	V	—	S	—	X	—	F	—	A	—	E	—	C(R)	—	(KC・WKC···etc.)
ESNP—A6	—	150.00	—	V2.5	—	S80	—	X210.05	—	F200.00			—	E1.60			—	TC3

Alteration details P.275

Alterations	Code	Spec.	1Code
	KC WC	KC・WC=0.1mm increments KC=D/2 ⋯ 0.05mm increments possible WC=V/2 ⋯ 0.05mm increments possible D/2≦KC<H/2, V/2≦WC<Q/2	Quotation
	WKC WWC	WKC・WWC=0.1mm increments WKC=D/2 ⋯ 0.05mm increments possible WWC=V/2 ⋯ 0.05mm increments possible D/2≦WKC<H/2, V/2≦WWC<Q/2	
	HC QC	HC・QC=0.1mm increments D≦HC<H, V≦QC<Q In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	TC JC	TC・JC=0.1mm increments (Dimensions L・X and F remain unchanged.) T/2≦TC<T, T—TC≦Lmax.—L J/2≦JC<J, J—JC≦Xmax.—X	

① Alterations for Ejector Sleeves : KC, WKC, HC, TC
② Center pin alteration : WC, WWC, QC, JC, CX, RX, SR, AC, RR

Alterations	Code	Spec.	1Code
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<E (orV)/2 E (orV) is a dimension prior to CX machining. α=CX	Quotation
	RX	RX=0.1mm increments V≦4.5, 0.3≦RX≦0.5, RX<E (orV)/2 V>4.5, 0.3≦RX≦1.0 E (orV) is a dimension prior to RX machining. α=RX	
	SR	Finishes the tip in spherical shape (SR). α==E (orV)/2 X is $^{+0.05}_{0}$ E (orV) is a dimension prior to SR machining.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Step Available for C/D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<V	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B, C, D V—A≧1.0 Step When Step D, C≧0.5	

Dies Steel
SKD61 equivalent
+
Nitrided

STEPPED EJECTOR SLEEVE & ONE-STEP CENTER PIN SETS

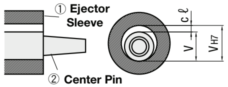
—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

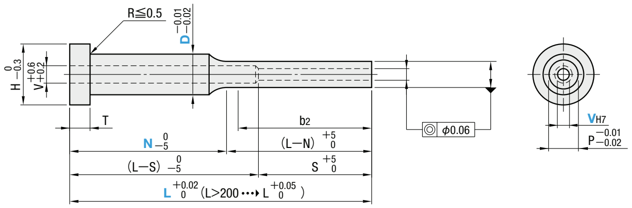
Part Number	Head Thickness (T·J)	T Head Thickness (T・J)
ESNM—□	4mm (T4)	0 −0.02
ESJM—□	4・6・8mm (JIS)	0 −0.05

Clearance (cℓ) between the ejector sleeve's internal diameter (V$_{H7}$) and the center pin's shaft diameter (V).



Clearance (cℓ)<0.03

① Ejector Sleeve



T V$_{H7}$dimension

V	tolerance
2.0～3.0	+0.010 0
3.1～5.5	+0.012 0

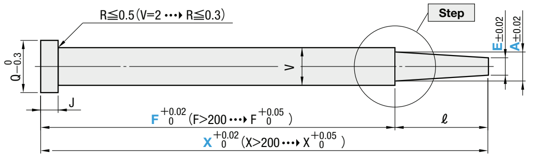
S dimension depends on the designated L dimension.

L	100.00～125.00	125.01～150.00	150.01～175.00	175.01～200.00	200.01～225.00	225.01～250.00	250.01～275.00	275.01～300.00
(L−S)	75	100	115	120	125	150	175	200

Head diameter/thickness of center pin

V	4mm head		JIS head	
	Q	J	Q	J
2.0	4	4	4	4
2.5	5		5	
3.0	6		6	
3.5	7		7	
4.0			8	6
4.5	8			
5.0				
5.5	9		9	

② Center Pin


R≦0.5 (V=2 ⋯→ R≦0.3)
Step
E±0.02
A±0.02
Q 0 −0.3
V
J
F +0.02 0 (F>200 ⋯→ F +0.05 0)
ℓ
X +0.02 0 (X>200 ⋯→ X +0.05 0)

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

① M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40±3HRC

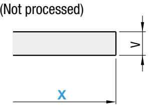
② M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40～45HRC

Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

No nitriding on the tip (ℓ) of center pin.

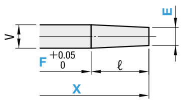
Range of guaranteed tip-diameter precision (b$_2$) (Details P.1306)

Step S (Not processed)



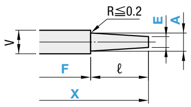
Alterations CX 0.3Designate in 0.3≦CX≦0.5, CX<V/2
Alterations RX 0.3Designate in 0.3 ≦ RX ≦ 0.5 ～ 1.0, RX < V/2
Alterations SR SR=V/2

Step A



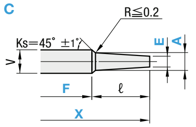
ℓ≧0.5+α

Step B



ℓ≧0.7+α

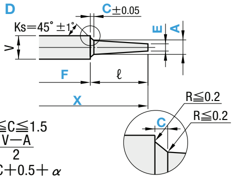
Step C



$\ell \geqq \frac{V-A}{2}+0.5+\alpha$

When AC code is used $\ell \geqq \frac{V-A}{2\tan AC}+0.5+\alpha$

Step D

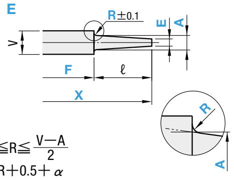


0.1≦C≦1.5

$C<\frac{V-A}{2}$

ℓ≧C+0.5+α

Step E



$0.3 \leqq R \leqq \frac{V-A}{2}$

ℓ≧R+0.5+α

Ejector Sleeve 4mm head H	Ejector Sleeve 4mm head T	Ejector Sleeve JIS head H	Ejector Sleeve JIS head T	P	Part Number Type	Part Number Type	Part Number Step	Part Number D	L 0.01mm increments	V	N	0.01mm increments X	0.01mm increments F	0.01mm increments A	0.01mm increments Emin.	0.1mm increments C・R	ℓmax.
7	4	—	—	V+1.5	ESNM — (4mm head)	—	S A B C D E	4	100.00～125.00	2.0	50 60	L+100≧X and X≧L+20	F≧100.00 No need to designate F when Step S is selected.	V>A≧E No need to designate A・E when Step S is selected. No need to designate A when Step A is selected.	0.70	Step D only 0.1≦C≦1.5 and $C<\frac{V-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{V-A}{2}$	V×10 (V≧5.0 ⋯→ ℓmax.=50)
									125.01～150.00		60 80						
8								5	100.00～125.00	2.0 2.5	50 60				1.00		
									125.01～150.00		60 80						
9								6	100.00～150.00	2.0	60 80						
									150.01～200.00	2.5 3.5	60 80						
									200.01～250.00	2.0 2.5 3.0	80 100				2.00		
11		13	8			ESJM — (JIS Head)		8	100.00～150.00	3.5 4.0	60 80						
									150.01～200.00		80 100						
									200.01～250.00	3.5 4.0 4.5	80 100 (120) (150)						
—	—	17		V+2.0	—			12	125.00～150.00	5.0 5.5	60 80 100						
									150.01～200.00		80 100 120						
									200.01～225.00		100 120						
									225.01～250.00		100 120 150						
									250.01～300.00		120 150						

N (120) and (150) are applicable for ESJM—alone.

Order

Part Number	—	L	—	V	—	N	—	X	—	F	—	A	—	E	—	C(R)
ESNM—B6	—	200.00	—	V2.5	—	N80	—	X300.00	—	F280.00	—	A2.00	—	E1.60		

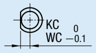
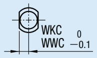
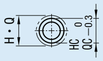
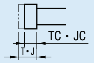
Days to Ship Quotation

Price Quotation

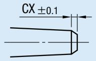
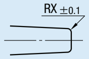
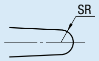
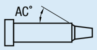
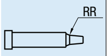
Alterations

Part Number	—	L	—	V	—	N	—	X	—	F	—	A	—	E	—	C(R)	—	(KC・WKC⋯etc.)
ESNM—B6	—	200.00	—	V2.5	—	N80	—	X300.00	—	F280.00	—	A2.00	—	E1.60			—	KC3.0

Alteration details P.275

Alterations	Code	Spec.	1Code
	KC WC	KC・WC=0.1mm increments KC=D/2 ⋯→ 0.05mm increments possible WC=V/2 ⋯→ 0.05mm increments possible D/2≦KC<H/2, V/2≦WC<Q/2	Quotation
	WKC WWC	WKC・WWC=0.1mm increments WKC=D/2 ⋯→ 0.05mm increments possible WWC=V/2 ⋯→ 0.05mm increments possible D/2≦WKC<H/2, V/2≦WWC<Q/2	
	HC QC	HC・QC=0.1mm increments D≦HC<H, V≦QC<Q In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	TC JC	TC・JC=0.1mm increments (Dimensions L・X and F remain unchanged.) T/2≦TC<T, T−TC≦Lmax.−L J/2≦JC<J, J−JC≦Xmax.−X	

① Alterations for Ejector Sleeves : KC, WKC, HC, TC
② Center pin alteration : WC, WWC, QC, JC, CX, RX, SR, AC, RR

Alterations	Code	Spec.	1Code
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<E (orV)/2 E (orV) is a dimension prior to CX machining. α=CX	Quotation
	RX	RX=0.1mm increments V≦4.5, 0.3≦RX≦0.5, RX<E (orV)/2 V>4.5, 0.3≦RX≦1.0 E (orV) is a dimension prior to RX machining. α=RX	
	SR	Finishes the tip in spherical shape (SR). α=E (orV)/2 X is $^{+0.05}_{0}$ E (orV) is a dimension prior to SR machining.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Step Available for C/D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<V	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B, C, D V−A≧1.0 Step When Step D, C≧0.5	

Dies Steel
SKD61 equivalent
+
Nitrided

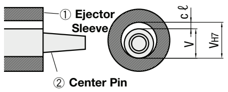
STEPPED EJECTOR SLEEVE & ONE-STEP CENTER PIN SETS

—L・V DIMENSION DESIGNATION TYPE—

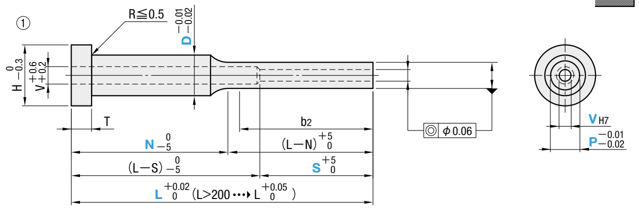
RoHS

Part Number	Head Thickness (T・J)	T Head Thickness (T・J)
ESND−☐	4mm (T4)	0 −0.02
ESJD−☐	4・6・8mm (JIS)	0 −0.05

Clearance (cℓ) between the ejector sleeve's internal diameter (VH7) and the center pin's shaft diameter (V).



Clearance (cℓ)<0.03

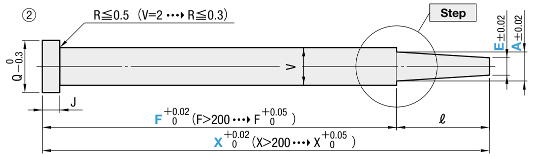


T VH7dimension tolerance

V	
2.0~3.0	$^{+0.010}_{0}$
3.1~6.0	$^{+0.012}_{0}$
6.1~8.0	$^{+0.015}_{0}$

Head diameter/thickness of center pin

V	4mm head Q	4mm head J	JIS head Q	JIS head J
2.0	4	4	4	4
2.1~2.5	5		5	
2.6~3.0	6		6	
3.1~3.5	7		7	
3.6~3.9			8	6
4.0				
4.1~4.5	8			
4.6~4.9			9	
5.0				
5.1~5.5	9			
5.6~5.9			10	
6.0				
6.1~6.4	10		11	
6.5				
6.6~7.0				
7.1~7.5	11		13	
7.6~7.9				8
8.0				


②
R≦0.5 (V=2 ⋯ R≦0.3)
Step
0 −0.3
J
V
E ±0.02
A ±0.02
F +0.02 0 (F>200 ⋯ F +0.05 0)
ℓ
X +0.02 0 (X>200 ⋯ X +0.05 0)

Default α=0
When CX code is used α=CX
When RX code is used α=RX
When SR code is used α=E/2

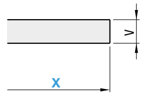
① M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40±3HRC

② M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40~45HRC

Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

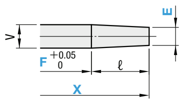
- No nitriding on the tip (ℓ) of center pin.
- Range of guaranteed tip-diameter precision (b2) (Details P.1306)

Step **S** (Not processed)



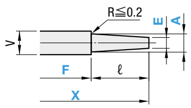
Alterations CX	Designate in 0.3≦CX≦0.5, CX<V/2
Alterations RX	Designate in 0.3≦RX≦0.5~1.0, RX<V/2
Alterations SR	SR=V/2

Step **A**



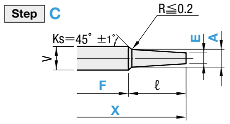
ℓ≧0.5+α

Step **B**



ℓ≧0.7+α

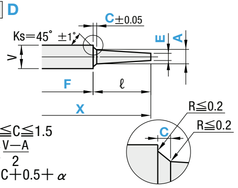
Step **C**



When AC code is used

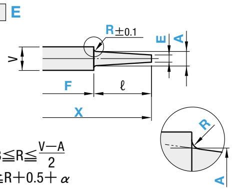
$\ell\geqq\frac{V-A}{2}+0.5+\alpha$ $\ell\geqq\frac{V-A}{2\tan AC}+0.5+\alpha$

Step **D**



- 0.1≦C≦1.5
- $C<\frac{V-A}{2}$
- ℓ≧C+0.5+α

Step **E**



- $0.3\leqq R\leqq\frac{V-A}{2}$
- ℓ≧R+0.5+α

Non JIS material definition is listed on P.1351 - 1352

Ejector Sleeve 4mm head		Ejector Sleeve JIS head		Part Number			L	V	P	N	S	0.01mm increments				0.1mm increments	ℓ max.
							0.01mm increments	0.1mm increments	0.01mm increments	1mm increments	1mm increments					C・R	
H	T	H	T	Type	Step	D						X	F	A	Emin.		
8	4	9	6	ESND− (4mm head) ESJD− (JIS head)	S A B C D E	5	50.00~250.00	2.0~3.0	3.50~4.95	N≧L/3 and L−N≧10	20~100 L / (L−S) min. 50.00~60.00 / 20 60.01~300.00 / 30	L+100≧X and X≧L+20	F≧50.00 No need to designate F when Step S is selected.	V>A≧E No need to designate A・E when Step S is selected. No need to designate A when Step A is selected.	1.00	Step D only 0.1≦C≦1.5 and $C<\frac{V-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{V-A}{2}$	V×10 (V≧5.0 ⋯ ℓ max.=50)
9						5.5		2.0~3.5	3.50~5.45								
		10				6	80.00~300.00	2.5~4.0	4.00~5.95								
10		11				6.5		2.5~4.0	4.00~6.45						1.50		
						7		2.5~4.5	4.00~6.95								
11		12				7.5		2.5~4.5	4.00~7.45								
		13	8			8		2.5~5.5	5.00~7.95		30~100 L−S≧20				2.00		
15		15				10		4.0~7.0	6.00~9.95								
17		17				12		4.0~8.0	7.50~11.95								

D	Limit value for P
5~ 8	P≧V+1.5
10~12	P≧V+2

Order

Part Number − L − V − P − N − S − X − F − A − E − C(R)
ESND−B6 − 300.00 − V2.5 − P4.10 − N140 − S100 − X400.00 − F370.00 − A2.10 − E1.60

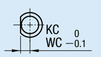
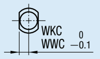
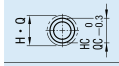
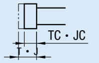
Days to Ship Quotation

Price Quotation

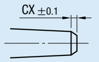
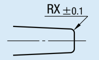
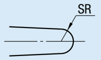
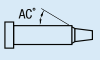
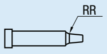
Alterations

Part Number − L − V − P − N − S − X − F − A − E − C(R) − (KC・WKC⋯etc.)
ESJD−C8 − 250.03 − V3.6 − P6.05 − N150 − S100 − X325.00 − F300.00 − A2.80 − E2.01 − KC5.5

Alteration details P.275

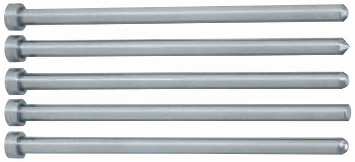
Alterations	Code	Spec.	1Code
	KC WC	KC・WC=0.1mm increments KC=D/2 ⋯ 0.05mm increments possible WC=V/2 ⋯ 0.05mm increments possible D/2≦KC<H/2, V/2≦WC<Q/2	Quotation
	WKC WWC	WKC・WWC=0.1mm increments WKC=D/2 ⋯ 0.05mm increments possible WWC=V/2 ⋯ 0.05mm increments possible D/2≦WKC<H/2, V/2≦WWC<Q/2	
	HC QC	HC・QC=0.1mm increments D≦HC<H, V≦QC<Q In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	TC JC	TC・JC=0.1mm increments (Dimensions L・X and F remain unchanged.) T/2≦TC<T, T−TC≦Lmax.−L J/2≦JC<J, J−JC≦Xmax.−X	

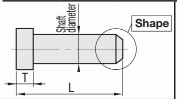
① Alterations for Ejector Sleeves : KC, WKC, HC, TC
② Center pin alteration : WC, WWC, QC, JC, CX, RX, SR, AC, RR

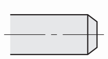
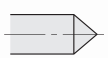
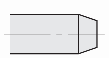
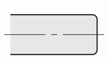
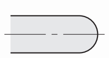
Alterations	Code	Spec.	1Code
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<E (orV)/2 E (orV) is a dimension prior to CX machining. α=CX	Quotation
	RX	RX=0.1mm increments V≦4.5, 0.3≦RX≦0.5, RX<E (orV)/2 V>4.5, 0.3≦RX≦1.0 E (orV) is a dimension prior to RX machining. α=RX	
	SR	Finishes the tip in spherical shape (SR). α==E (orV)/2 X is $^{+0.05}_{0}$ E (orV) is a dimension prior to SR machining.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Step Available for C/D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<V	
	RR	Changes R (normally 0.2 or less) to R0.3~0.5. (for Strength improvement) Designation method RR Available for Step B, C, D V−A≧1.0 When Step D, C≧0.5	

STRAIGHT CENTER PINS

STRAIGHT CENTER PINS WITH TIP PROCESS





Shape C  Shape G  Shape T  Shape R  Shape B 

M	Head thickness (T)	Shaft diameter Tolerance	Shaft Diameter (D) Selection Type		Shaft diameter(P) 0.01mm increments		Center pin shaft diameter tolerance	Applicable ejector sleeve hole (V) tolerance
SKH51 equivalent	4mm (T4)	0 −0.005	CPH−5L☐	P.339	CPHG−5L☐	P.341	0 −0.005	+0.005 0
		−0.01 −0.02	CPHE−5L☐	P.339	CPHGE−5L☐	P.341	−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)	0 −0.005	CPHJ−5L☐	P.339	CPHJG−5L☐	P.341	0 −0.005	+0.005 0
		−0.01 −0.02	CPHJE−5L☐	P.339	CPHJGE−5L☐	P.341	−0.01 −0.02	+0.01 0 or H7
SKD61 equivalent + Nitriding	4mm (T4)	*Reference tolerance −0.01 −0.02	CPN−5L☐	P.343	CPNG−5L☐ (Shaft diameter 0.1mm increments)	P.345	−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)		CPJ−5L☐	P.343	CPJG−5L☐ (Shaft diameter 0.1mm increments)	P.345		
SKD61 equivalent + Nitriding With cooling hole	4mm (T4)	*Reference tolerance −0.01 −0.02	RDCPN−5L☐	P.347	—		−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)		RDCPJ−5L☐	P.347	—			

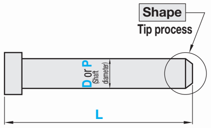
*The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the shaft size and/or length. For details, refer to the Catalog page of each product.

■ SELECTION METHOD FOR STRAIGHT CENTER PINS WITH TIP PROCESSED

■Codes for Straight Center Pins with Tip Processed Specifications

Shaft Diameter (D) Selection Type	CP☐(E)−5L☐ **RDCP☐ −5L☐
SHAFT DIAMETER (P) DESIGNATION TYPE	CP☐G(E)−5L☐

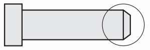
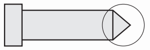
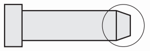
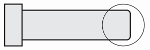
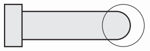
**A part number of straight center pin that starts by RD is in the type of straight center pin with cooling hole.



Material・tolerance codes

M	Head thickness (T)	Shaft diameter Tolerance	Material and tolerance codes
SKH51 equivalent	4mm (T4)	0 −0.005	H
		−0.01 −0.02	HE
	6・8mm (JIS)	0 −0.005	HJ
		−0.01 −0.02	HJE
SKD61 equivalent + Nitriding	4mm (T4)	*Reference tolerance −0.01 −0.02	N
	6・8mm (JIS)		J

Tip process code

Shape	Tip process code
	C (C chamfered)
	G (Cone)
	T (Tapered)
	R (R chamfered)
	B (Spherical)

■Material characteristics of center pins

M		High speed steel SKH51(M2)(1.3343)	Dies Steel SKD61 (H13)(1.2344) +Nitriding
H HRC		58～60	Surface 900HV～ Base material 40～45
Machining characteristics	Abrasion resistance	5	4
	Ability to be mirror-finished	4	3
	Toughness	3	4
	Corrosion resistance	3	3
Physical characteristics	Watt density [g/cm³]	8.2	7.75
	Modulus of longitudinal elasticity [kgf/mm²]	22300	21000
	Coefficient of thermal expansion [×10⁶/℃]	10.1	10.8
	Thermal conductivity coefficient [cal/cm・sec・℃]	0.051	0.061
Mechanical characteristics	Tensile strength [kgf/mm²]	235	135
	Charpy impact values [kgf・m/cm²]	2	4

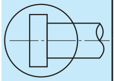
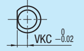
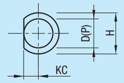
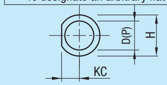
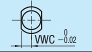
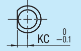
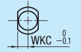
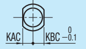
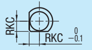
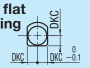
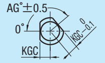
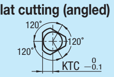
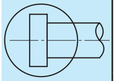
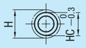
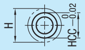
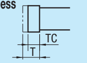
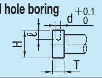
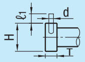
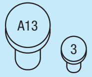
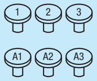
Machining characteristics 1 (Poor) 3 (Good) 5 (Excellent)

Conversion expression
$1kgf/mm^2 = 9.81N/mm^2$
$1cal/cm・sec・℃ = 418.6W/M.K$
$1kgf・m/cm^2 = 9.81J/cm^2$

Use these data for reference only as they are dependent on specific heat treatment and usage conditions.

ALTERATION GUIDE FOR STRAIGHT CENTER PINS

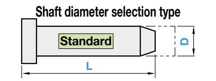
Non JIS material definition is listed on P.1351 - 1352

Items	Applicable Products	Alterations	Code	Specifications		1Code
Key flat cutting 	Straight Center Pins	Precision key flat cutting 	VKC	Precision single flat cutting High speed steel SKH51 equivalent only Range of designation (DorP)/2≦VKC<H/2	To make a flat at the shaft diameter position for straight/One-step/Two-step/Taperless and stepped types  Unit of designation ・Straight type Shaft diameter selection type (D/2)……0.05mm increments possible Shaft diameter designation (0.01mm increments) type(P/2)……0.005mm increments possible Shaft diameter designation (0.1mm increments) type(P/2)……0.05mm increments possible Designation method ・VKC2.82 (When P5.64) ・VWC3.375 (When P6.75) ・KC2.61 (When P5.22) ・WKC3.085 (When P6.17) ・RKC2.74 (When P5.48) ・DKC3 (When D6) ・KGC1.5−AG125 (When D3) ・KTC3.085 (When P6.17) To designate an arbitrary flat size  Unit of designation 0.1mm increments Designation method ・VKC1.4 ・VWC2.3 ・KC1.4 ・WKC2.3 ・KAC1.4−KBC1.6 ・RKC1.4 ・DKC1.75 ・KGC1.4−AG85 ・KTC2.3	Quotation
		Precision key flat cutting 	VWC	Precision two flats cutting High speed steel SKH51 equivalent only Range of designation (DorP)/2≦VWC<H/2		
		Key flat cutting 	KC	Single flat cutting Range of designation (DorP)/2≦KC<H/2		
		Key flat cutting 	WKC	Two flats cutting Range of designation (DorP)/2≦WKC<H/2		
		Key flat cutting 	KAC KBC	Varied width parallel flats cutting Range of designation (DorP)/2≦KAC KAC<KBC<H/2		
		Key flat cutting 	RKC	Two flats (right angled) cutting Range of designation (DorP)/2≦RKC<H/2		
		Key flat cutting 	DKC	Three flats cutting Range of designation (DorP)/2≦DKC<H/2		
		Key flat cutting (angled) 	KGC	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation (DorP)/2≦KGC<H/2 AG=1° increments 0°<AG<360°		
		Key flat cutting (angled) 	KTC	Three flats cutting at 120° Range of designation (DorP)/2≦KTC<H/2		
Head alteration 	Straight Center Pins	Head diameter change 	HC	Reduces the head diameter. Range of designation DorP≦HC<H Available when DorP≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Unit of designation 0.1mm increments Designation method HC6.5	
		Head diameter change (precision) 	HCC	Reduces the head diameter. (Precision) Range of designation DorP+0.5≦HCC<H−0.3 Available when DorP≧1.5	Unit of designation 0.1mm increments Designation method HCC6.1	
		Head thickness change 	TC	Reduces the head thickness. Dimension L remains unchanged. Range of designation T/2≦TC<T T−TC≦Lmax.−L Available when DorP≧1.5	Unit of designation 0.1mm increments Designation method TC3.5	
		Dowel hole boring 	NC	Adds a dowel hole. Available when head type≧4 T 4 6 8 / d 2 3 / ℓ 3 5 (T 4: d 2, ℓ 3; T 6, 8: d 3, ℓ 5) ⊗ Combination with other than NHC・NHN not available	Designation method NC	
		Dowel hole+Spring pin 	NCW	Adds a dowel hole+ and drives a spring pin. Available when head type≧4 T 4 6 8 / d 2 3 / ℓ₁ 5 (T 4: d 2; T 6, 8: d 3; ℓ₁ 5) ⊗ Combination with other than NHC・NHN not available	Designation method NCW	
		Numbering 	NHC	Combination with key flat cutting not available. Electrolytic marking of ID code on the head(in 5 point, Round Gothic type) Available characters Numerals: 0～9; Alphabets: A～Z Range of designation 1 character when 2≦H<4.9 1 or 2 characters when 5≦H<6.9(Only the first character may be an alphabet.) Up to 3 characters when 7≦H(Only the first character may be an alphabet.) Designation method NHC−6, NHC−23, NHC−A90 Available when head diameter H≧2		
		Numbering 	NHN	Automatic sequential numbering on the head Adds a sequential number on the head of each ejector pin when two or more pieces of identical size are ordered. Available characters Same as NHC (see above) Range of designation Same as NHC (see above) Designation method When 3 pieces are ordered with NHN−1 A sequential number starting from 1 is added on the head of each piece. When 10 pieces are ordered with NHN−A15 A sequential number starting from A15・・・(through A24) is added on the head of each piece. Available when head diameter H≧2 Only available when two or more pieces of identical size are ordered.		

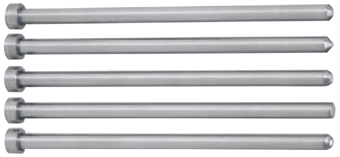
High Speed Steel
SKH51 equivalent
D$^{0}_{-0.005}$ /D$^{-0.01}_{-0.02}$

STRAIGHT CENTER PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION TYPE—


Shaft diameter selection type
Standard
D
L

Non JIS material definition is listed on P.1351 - 1352

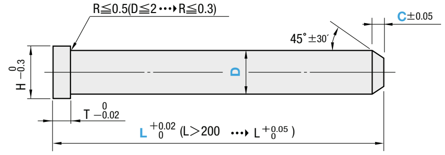


M SKH51 equivalent Range of guaranteed shaft diameter precision (Details ☞ **P.1305**)
H 58～60HRC Range of guaranteed base material hardness (Details ☞ **P.1307**)

Type	T D	Head thickness (T)	Applicable ejector sleeve hole tolerance
CPH —5L	$^{0}_{-0.005}$	4mm (T4)	$^{+0.005}_{0}$ Detail ☞ **P.1309**
CPHJ —5L		6・8mm (JIS)	
CPHE —5L	$^{-0.01}_{-0.02}$	4mm (T4)	$^{+0.01}_{0}$ or H7 Detail ☞ **P.1309**
CPHJE—5L		6・8mm (JIS)	

Shape (Tip shape)

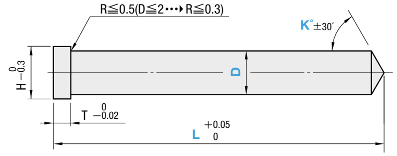
Shape C
(C chamfered)


R≦0.5(D≦2 ⋯▸R≦0.3)
45°±30′
C±0.05
H $^{0}_{-0.3}$
D
T $^{0}_{-0.02}$
L $^{+0.02}_{0}$ (L>200 ⋯▸ L $^{+0.05}_{0}$)

C⋯0.1mm increments

$0.1 \leqq C \leqq \frac{D-0.2}{2}$

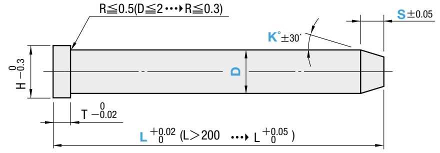
Shape G
(Cone)


R≦0.5(D≦2 ⋯▸R≦0.3)
K°±30′
H $^{0}_{-0.3}$
D
T $^{0}_{-0.02}$
L $^{+0.05}_{0}$

K⋯1° increments

45≦K<90

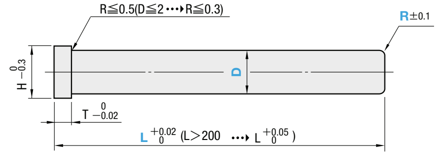
Shape T
(Tapered)


R≦0.5(D≦2 ⋯▸R≦0.3)
K°±30′
S±0.05
H $^{0}_{-0.3}$
D
T $^{0}_{-0.02}$
L $^{+0.02}_{0}$ (L>200 ⋯▸ L $^{+0.05}_{0}$)

S⋯0.1mm increments
(L−S)≧45
and
0.1≦S≦D×2
and
$\frac{D}{2} - S\tan K \geqq 0.1$

K⋯1° increments
1≦K≦45

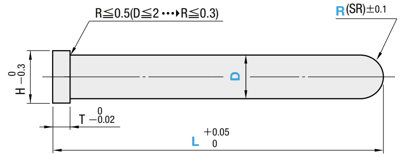
Shape R
(R chamfered)


R≦0.5(D≦2 ⋯▸R≦0.3)
R±0.1
H $^{0}_{-0.3}$
D
T $^{0}_{-0.02}$
L $^{+0.02}_{0}$ (L>200 ⋯▸ L $^{+0.05}_{0}$)

R⋯0.1mm increments

$0.2 \leqq R \leqq \frac{D-0.2}{2}$

Shape B
(Spherical)


R≦0.5(D≦2 ⋯▸R≦0.3)
R(SR)±0.1
H $^{0}_{-0.3}$
D
T $^{0}_{-0.02}$
L $^{+0.05}_{0}$

- Default R (SR)=$\frac{D}{2}$

*SR may be designated within
$\frac{D}{2} < R \leqq 2 \times D$
R⋯0.1mm increments possible

Order

Part Number	—	L	—	Tip size(C・S・K・R)
CPH —5LC5	—	100.00	—	C1.0
CPHJ—5LT5	—	100.00	—	S2.0—K30

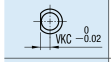
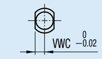
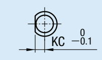
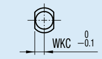
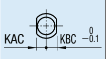
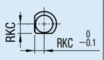
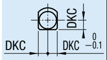
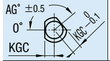
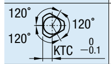
Days to Ship Quotation

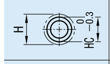
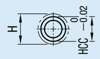
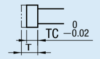
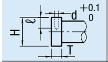
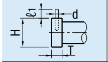
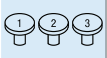
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Shape	D	L 0.01mm increments	Shape (Tip size)
3	4	—	—	CPH —5L CPHE—5L	—	C G T R B	1	50.00～200.00	Shape C C⋯0.1mm increments Shape G K⋯1° increments Shape T S⋯0.1mm increments K⋯1° increments Shape R R⋯0.1mm increments Shape B Default R (SR)=$\frac{D}{2}$ (R⋯0.1mm increments possible) Refer to the working limits shown in the drawing.
							1.5	50.00～250.00	
4							2		
5							2.5		
6							3	50.00～300.00	
7							3.5		
		8	6		CPHJ —5L CPHJE—5L		4		
8							4.5		
		9					5	50.00～350.00	
9							5.5		
		10					6		
10		11					6.5		
							7		
11		13	8				8		
14		14					9		
15		15					10		
17		17					12		

Alterations

Part Number	—	L	—	Tip size(C・S・K・R)	—	(KC・WKC⋯etc.)
CPH —5LB6	—	100.00	—	R4.0	—	HC7.0
CPHJ—5LT5	—	100.00	—	S2.0—K30	—	HC7.0

Alteration details ☞ P.338

Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Precision two flats cutting D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

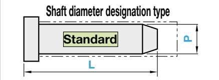
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H, D≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T−TC≦Lmax.−L (Dimension L remains unchanged.)	Quotation
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available T | d | ℓ: 4 | 2 | 3; 6, 8 | 3 | 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available T | d | ℓ1: 4 | 2 | 5; 6, 8 | 3 |	
	NHC	Numbering on the head How to order ☞ **P.338** Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order ☞ **P.338** Available when H≧2	

Price Quotation

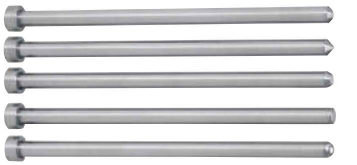
High Speed Steel
SKH51 equivalent
$P^{0}_{-0.005}$ /$P^{-0.01}_{-0.02}$

STRAIGHT CENTER PINS WITH TIP PROCESS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—


Shaft diameter designation type
Standard
P
L

Non JIS material definition is listed on P.1351 - 1352

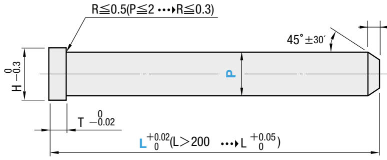


M SKH51 equivalent Range of guaranteed shaft diameter precision (Details P.1305)
H 58～60HRC Range of guaranteed base material hardness (Details P.1307)

Type	T P	Head thickness (T)	Applicable ejector sleeve hole tolerance
CPHG −5L	$^{0}_{-0.005}$	4mm (T4)	$^{+0.005}_{0}$ Detail P.1309
CPHJG−5L		6・8mm (JIS)	
CPHGE −5L	$^{-0.01}_{-0.02}$	4mm (T4)	$^{+0.01}_{0}$ or H7 Detail P.1309
CPHJGE−5L		6・8mm (JIS)	

Shape (Tip shape)

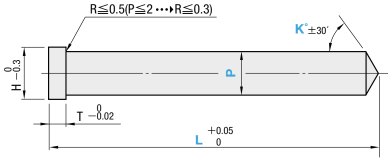
Shape C
(C chamfered)


R≦0.5(P≦2 ···▸R≦0.3)
45°±30′
C ±0.05
H $^{0}_{-0.3}$
P
T $^{0}_{-0.02}$
L $^{+0.02}_{0}$(L>200 ···▸L $^{+0.05}_{0}$)

C···0.1mm increments

$0.1\leqq C\leqq \frac{P-0.2}{2}$

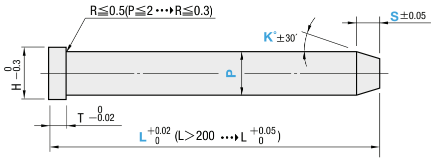
Shape G
(Cone)


R≦0.5(P≦2 ···▸R≦0.3)
K°±30′
H $^{0}_{-0.3}$
P
T $^{0}_{-0.02}$
L $^{+0.05}_{0}$

K···1° increments

45≦K<90

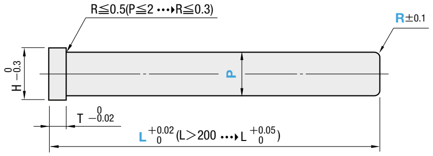
Shape T
(Tapered)


R≦0.5(P≦2 ···▸R≦0.3)
K°±30′
S±0.05
H $^{0}_{-0.3}$
P
T $^{0}_{-0.02}$
L $^{+0.02}_{0}$ (L>200 ···▸L $^{+0.05}_{0}$)

S···0.1mm increments
(L−S)≧45
and
0.1≦S≦P×2
and
$\frac{P}{2}-S\tan K\geqq 0.1$

K···1° increments
1≦K≦45

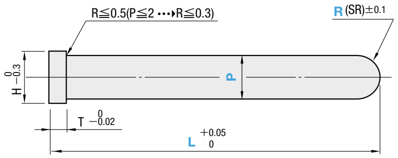
Shape R
(R chamfered)


R≦0.5(P≦2 ···▸R≦0.3)
R±0.1
H $^{0}_{-0.3}$
P
T $^{0}_{-0.02}$
L $^{+0.02}_{0}$(L>200 ···▸L $^{+0.05}_{0}$)

R···0.1mm increments

$0.2\leqq R\leqq \frac{P-0.2}{2}$

Shape B
(Spherical)


R≦0.5(P≦2 ···▸R≦0.3)
R (SR)±0.1
H $^{0}_{-0.3}$
P
T $^{0}_{-0.02}$
L $^{+0.05}_{0}$

・Default R (SR)=$\frac{P}{2}$

＊SR may be designated within
$\frac{P}{2}<R\leqq 2\times P$
R··· 0.1mm increments possible

Order

Part Number	L	P	Tip size(C・S・K・R)
CPHG −5LC5	100.00	P4.85	C1.0
CPHJG−5LT5	100.00	P4.85	S2.0−K30

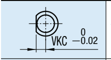
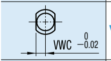
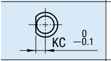
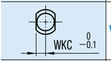
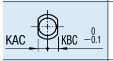
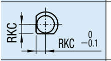
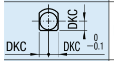
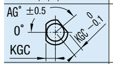
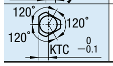
Days to Ship Quotation

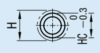
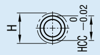
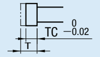
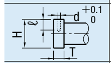
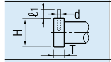
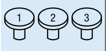
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Shape	No.	0.01mm increments L	0.01mm increments P	Shape (Tip size)
3	4	—	—	CPHG−5L CPHGE−5L	—	C G T R B	1	50.00～150.00	0.80～ 0.99	Shape C C···0.1mm increments Shape G K···1° increments Shape T S···0.1mm increments K···1° increments Shape R R···0.1mm increments Shape B Default R (SR)=$\frac{P}{2}$ (R···0.1mm increments possible) Refer to the working limits shown in the drawing.
								150.01～200.00	0.90～ 0.99	
							1.5	50.00～250.00	1.00～ 1.49	
4							2		1.50～ 1.99	
5							2.5		2.00～ 2.49	
6							3	50.00～300.00	2.50～ 2.99	
7							3.5		3.00～ 3.49	
		8	6		CPHJG−5L CPHJGE−5L		4		3.50～ 3.99	
8							4.5		4.00～ 4.49	
		9					5	50.00～350.00	4.50～ 4.99	
9							5.5		5.00～ 5.49	
		10					6		5.50～ 5.99	
10		11					6.5		6.00～ 6.49	
							7		6.50～ 6.99	
11		13	8				8		7.00～ 7.99	
15		15					10		8.00～ 9.99	
17		17					12		10.00～11.99	

Alterations

Part Number	L	P	Tip size(C・S・K・R)	(KC・WKC···etc.)
CPHG −5LC5	100.00	P4.85	C1.0	HC7.0
CPHJG−5LT5	100.00	P4.85	S2.0−K30	HC7.0

Alteration details P.338

Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Precision two flats cutting P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting P/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

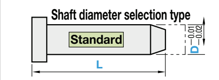
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P≦HC<H,P≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3,P≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T,P≧1.5 T−TC≦Lmax.−L (Dimension L remains unchanged.)	Quotation
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN not available T 4, d 2, ℓ 3; T 6・8, d 3, ℓ 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN not available T 4, d 2; T 6・8, d 3; ℓ1 5	
	NHC	Numbering on the head How to order P.338 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.338 Available when H≧2	

Price Quotation

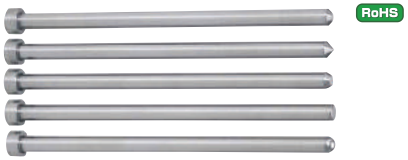
Dies Steel
SKD61 equivalent+Nitrided
D $^{-0.01}_{-0.02}$

STRAIGHT CENTER PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION TYPE—



Non JIS material definition is listed on P.1351 - 1352



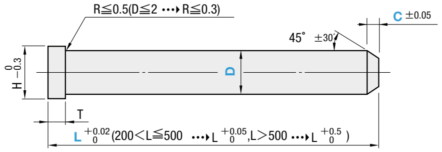
M SKD61 equivalent+Nitrided
H Surface 900HV~
Base material 40~45HRC

Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed shaft diameter precision (Details P.1308)
No nitriding on the tip.

Type	D	Head thickness(T)	Head Thickness(T)	Applicable ejector sleeve hole tolerance
CPN−5L	$^{-0.01}_{-0.02}$	4mm (T4)	$^{0}_{-0.02}$ (L>300 ···T $^{0}_{-0.05}$)	$^{+0.01}_{0}$ or H7 Detail P.1309
CPJ−5L	D>12 or L>500 ··· D $^{-0.01}_{-0.03}$	6・8mm (JIS)	$^{0}_{-0.05}$	

Shape (Tip shape)

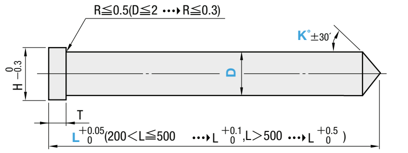
Shape C
(C chamfered)


R≦0.5(D≦2 ···R≦0.3)
C ±0.05
45° ±30′
H $^{0}_{-0.3}$
D
T
L $^{+0.02}_{0}$ (200<L≦500 ···L $^{+0.05}_{0}$, L>500 ···L $^{+0.5}_{0}$)

C···0.1mm increments

$0.1 \leqq C \leqq \frac{D-0.2}{2}$

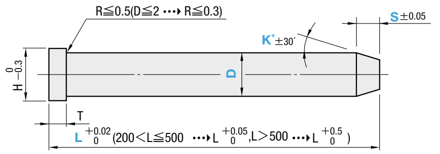
Shape G
(Cone)


R≦0.5(D≦2 ···R≦0.3)
K° ±30′
H $^{0}_{-0.3}$
D
T
L $^{+0.05}_{0}$ (200<L≦500 ···L $^{+0.1}_{0}$, L>500 ···L $^{+0.5}_{0}$)

K···1° increments

$45 \leqq K < 90$

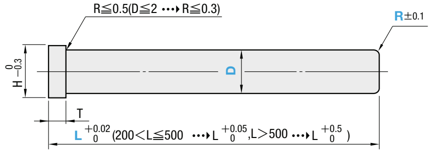
Shape T
(Tapered)


R≦0.5(D≦2 ···R≦0.3)
S ±0.05
K° ±30′
H $^{0}_{-0.3}$
D
T
L $^{+0.02}_{0}$ (200<L≦500 ···L $^{+0.05}_{0}$, L>500 ···L $^{+0.5}_{0}$)

S···0.1mm increments
$(L-S) \geqq 45$
and
$0.1 \leqq S \leqq D \times 2$
and
$\frac{D}{2} - S\tan K \geqq 0.1$

K···1° increments
$1 \leqq K \leqq 45$

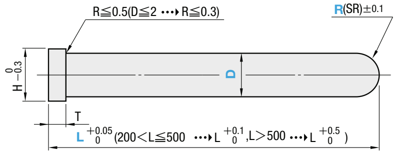
Shape R
(R chamfered)


R≦0.5(D≦2 ···R≦0.3)
R ±0.1
H $^{0}_{-0.3}$
D
T
L $^{+0.02}_{0}$ (200<L≦500 ···L $^{+0.05}_{0}$, L>500 ···L $^{+0.5}_{0}$)

R···0.1mm increments

$0.2 \leqq R \leqq \frac{D-0.2}{2}$

Shape B
(Spherical)


R≦0.5(D≦2 ···R≦0.3)
R(SR) ±0.1
H $^{0}_{-0.3}$
D
T
L $^{+0.05}_{0}$ (200<L≦500 ···L $^{+0.1}_{0}$, L>500 ···L $^{+0.5}_{0}$)

・Default R (SR)$=\frac{D}{2}$

* SR may be designated within
$\frac{D}{2} < R \leqq 2 \times D$
R··· 0.1mm increments possible

Order

Part Number	—	L	—	Tip size(C・S・K・R)
CPN−5LC5	—	100.00	—	C1.0
CPJ−5LT5	—	100.00	—	S2.0−K30

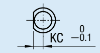
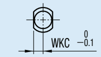
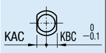
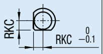
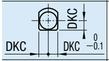
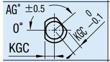
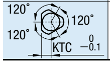
Days to Ship Quotation

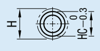
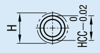
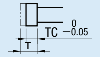
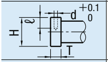
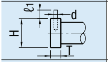
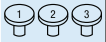
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Shape	D	L 0.01mm increments CPN−5L	L 0.01mm increments (L>500 ··· 0.1mm increments) CPJ−5L	Shape (Tip size)
3	4	—	—	CPN−5L	—	C G T R B	1.5	50.00~250.00	—	Shape C C···0.1mm increments Shape G K···1° increments Shape T S···0.1mm increments K···1° increments Shape R R···0.1mm increments Shape B Default R (SR)$=\frac{D}{2}$ (R···0.1mm increments possible)
4							2	50.00~400.00		
5							2.5			
6							3	50.00~400.00		
7							3.5			
		8	6		CPJ−5L		4		50.00~500.00	
8							4.5			
		9					5	50.00~500.00		
9							5.5			
		10					6	50.00~500.00	50.00~600.00	
10		11					6.5			
							7			
11		13	8				8			
15		15					10			
17		17					12	50.00~500.00	50.00~700.00	
—	—	20		—			15	—		Refer to the working limits shown in the drawing.
		21					16			

Alterations

Part Number	—	L	—	Tip size(C・S・K・R)	—	(KC・WKC···etc.)
CPN−5LC5	—	100.00	—	C1.0	—	HC7.0
CPJ−5LT5	—	100.00	—	S2.0−K30	—	HC7.0

Alteration details P.338

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

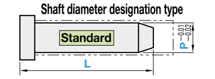
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	TC	TC=0.1mm increments T/2≦TC<T T−TC≦Lmax.−L (Dimension L remains unchanged.)	
	NC	Dowel hole boring Combination with other than NHC・NHN not available T 4: d 2, ℓ 3 T 6, 8: d 3, ℓ 5	
	NCW	Dowel hole boring+Spring pin driving Combination with other than NHC・NHN not available T 4: d 2 T 6, 8: d 3 ℓ1 5	
	NHC	Numbering on the head How to order P.338 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.338 Available when H≧2	

Price Quotation

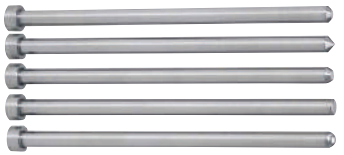
Dies Steel
SKD61 equivalent+Nitrided
P $^{-0.01}_{-0.02}$

STRAIGHT CENTER PINS WITH TIP PROCESS

—SHAFT DIAMETER (P) DESIGNATION (0.1mm INCREMENTS) TYPE—



Non JIS material definition is listed on P.1351 - 1352



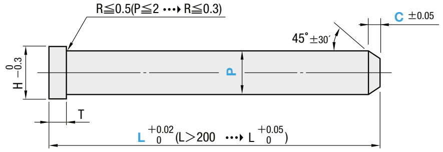
M SKD61 equivalent+Nitrided
H Surface 900HV~
Base material 40~45HRC

Range of guaranteed shaft diameter precision (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed shaft diameter precision (Details P.1308)
No nitriding on the tip.

Type	T P	Head thickness (T)	T Head thickness (T)	Applicable ejector sleeve hole tolerance
CPNG—5L	$^{-0.01}_{-0.02}$ P>12 ···▸ P $^{-0.01}_{-0.03}$	4mm (T4)	$^{0}_{-0.02}$ (L>300 ···▸T $^{0}_{-0.05}$)	$^{+0.01}_{0}$ or H7 Detail P.1309
CPJG—5L		6・8mm (JIS)	$^{0}_{-0.05}$	

Shape (Tip shape)

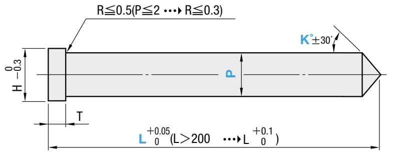
Shape C
(C chamfered)



C···0.1mm increments

$0.1 \leqq C \leqq \frac{P-0.2}{2}$

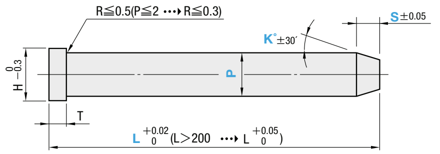
Shape G
(Cone)



K···1° increments

$45 \leqq K < 90$

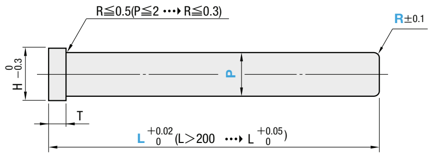
Shape T
(Tapered)



S···0.1mm increments
$(L-S) \geqq 45$
and
$0.1 \leqq S \leqq P \times 2$
and
$\frac{P}{2} - S\tan K \geqq 0.1$

K···1° increments
$1 \leqq K \leqq 45$

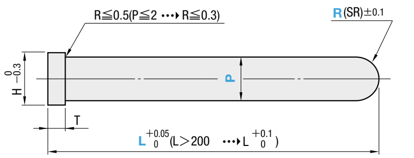
Shape R
(R chamfered)



R···0.1mm increments

$0.2 \leqq R \leqq \frac{P-0.2}{2}$

Shape B
(Spherical)



- Default R (SR)$=\frac{P}{2}$

* SR may be designated within
$\frac{P}{2} < R \leqq 2 \times P$
R··· 0.1mm increments possible

Order

Part Number	—	L	—	P	—	Tip size(C・S・K・R)
CPNG—5LC5	—	100.00	—	P4.9	—	C1.0
CPJG—5LT5	—	100.00	—	P4.9	—	S2.0—K30

Days to Ship Quotation

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Shape	No.	L 0.01mm increments	P 0.1mm increments
4	4	—	—	CPNG—5L	—	C G T R B	2	50.00~400.00	1.5~ 1.9
5							2.5		2.0~ 2.4
6							3	50.00~400.00	2.5~ 2.9
7							3.5		3.0~ 3.4
		8	6		CPJG—5L		4		3.5~ 3.9
8							4.5		4.0~ 4.4
		9					5	50.00~500.00	4.5~ 4.9
9							5.5		5.0~ 5.4
		10					6		5.5~ 5.9
10		11					6.5		6.0~ 6.4
							7		6.5~ 6.9
11		13	8				8		7.0~ 7.9
15		15					10		8.0~ 9.9
17		17					12		10.0~11.9
—	—	20		—			15		12.0~14.9
		21					16		15.0~15.9

Shape (Tip size)

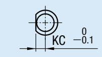
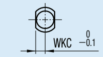
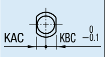
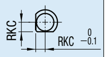
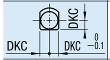
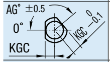
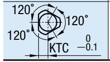
Shape C C···0.1mm increments
Shape G K···1° increments
Shape T S···0.1mm increments
K···1° increments
Shape R R···0.1mm increments
Shape B Default R (SR)$=\frac{P}{2}$
(R···0.1mm increments possible)

Refer to the working limits shown in the drawing.

Alterations

Part Number	—	L	—	P	—	Tip size(C・S・K・R)	—	(KC・WKC···etc.)
CPNG—5LC5	—	100.00	—	P4.9	—	C1.0	—	HC7.0
CPJG—5LT5	—	100.00	—	P4.9	—	S2.0—K30	—	HC7.0

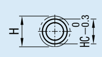
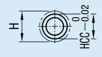
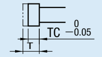
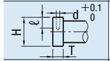
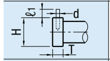
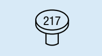
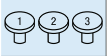
Alteration details P.338

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

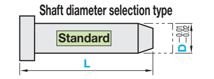
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3	
	TC	TC=0.1mm increments T/2≦TC<T T−TC≦Lmax.−L (Dimension L remains unchanged.)	
	NC	Dowel hole boring ⊗ Combination with other than NHC・NHN not available T 4: d 2, ℓ 3 T 6, 8: d 3, ℓ 5	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN not available T 4: d 2 T 6, 8: d 3 ℓ_1 5	
	NHC	Numbering on the head How to order P.338 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.338 Available when H≧2	

Price Quotation

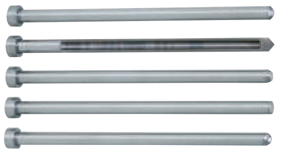
Dies Steel
SKD61 equivalent＋Nitrided
D $^{-0.01}_{-0.02}$

TIP PROCESSED STRAIGHT CENTER PINS WITH COOLING HOLE

—SHAFT DIAMETER (D) SELECTION TYPE—


Shaft diameter selection type
Standard
L

Non JIS material definition is listed on P.1351 - 1352



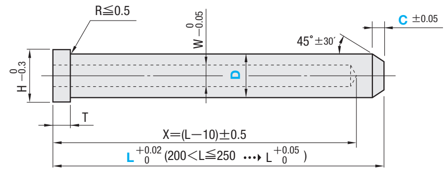
RoHS

- **M** SKD61 equivalent＋Nitrided — Range of guaranteed shaft diameter precision (Details P.1305)
- **H** Surface 900HV～ — Range of guaranteed base material hardness (Details P.1307)
- Base material 40±3HRC — Range of guaranteed shaft diameter precision (Details P.1308)
- No nitriding on the tip.
- No nitriding to the cooling hole.

Type	T D	Head thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
RDCPN−5L	$^{-0.01}_{-0.02}$	4mm (T4)	$^{0}_{-0.02}$	$^{+0.01}_{0}$ or H7 Detail P.1309
RDCPJ−5L	D＞12 D$^{-0.01}_{-0.03}$	6・8mm (JIS)	$^{0}_{-0.05}$	

Shape (Tip shape)

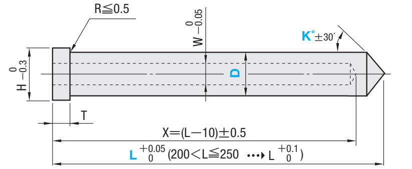
Shape C
(C chamfered)


R≦0.5
W $^{0}_{-0.05}$
C ±0.05
45°±30′
H $^{0}_{-0.3}$
D
T
X=(L−10)±0.5
L $^{+0.02}_{0}$ (200＜L≦250 ···· L $^{+0.05}_{0}$)

C···0.1mm increments

$0.1 \leqq C \leqq \frac{D-0.2}{2}$

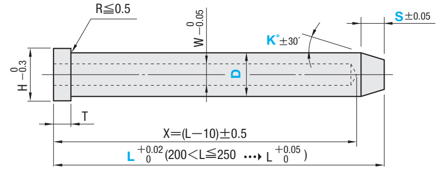
Shape G
(Cone)


R≦0.5
W $^{0}_{-0.05}$
K°±30′
H $^{0}_{-0.3}$
D
T
X=(L−10)±0.5
L $^{+0.05}_{0}$ (200＜L≦250 ···· L $^{+0.1}_{0}$)

K···1° increments

45≦K＜90

Shape T
(Tapered)


R≦0.5
W $^{0}_{-0.05}$
S±0.05
K°±30′
H $^{0}_{-0.3}$
D
T
X=(L−10)±0.5
L $^{+0.02}_{0}$ (200＜L≦250 ···· L $^{+0.05}_{0}$)

S···0.1mm increments

(L−S)≧45

and

0.1≦S≦D×2

and

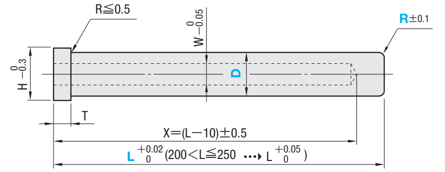
$\frac{D}{2}$−StanK≧0.1

K···1° increments

1≦K≦45

* When S≧10, X=L−S

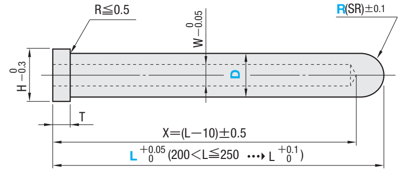
Shape R
(R chamfered)


R≦0.5
W $^{0}_{-0.05}$
R±0.1
H $^{0}_{-0.3}$
D
T
X=(L−10)±0.5
L $^{+0.02}_{0}$ (200＜L≦250 ···· L $^{+0.05}_{0}$)

R···0.1mm increments

$0.2 \leqq R \leqq \frac{D-0.2}{2}$

Shape B
(Spherical)


R≦0.5
W $^{0}_{-0.05}$
R(SR)±0.1
H $^{0}_{-0.3}$
D
T
X=(L−10)±0.5
L $^{+0.05}_{0}$ (200＜L≦250 ···· L $^{+0.1}_{0}$)

・Default R (SR)=$\frac{D}{2}$

* SR may be designated within
$\frac{D}{2}$＜R≦2×D
R··· 0.1mm increments possible

Order

Part Number	—	L	—	Tip size(C・S・K・R)
RDCPN−5LR8	—	240.00	—	R0.2
RDCPJ−5LT15	—	100.00	—	S5.0−K30

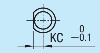
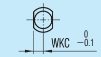
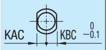
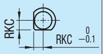
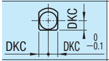
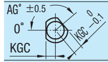
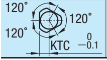
Days to Ship Quotation

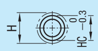
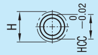
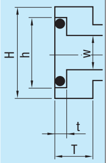
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Shape	D	L 0.01mm increments	Shape (Tip size)	W	X
9	4	10	6	RDCPN−5L	RDCPJ−5L	C G T R B	6	70.00～150.00	Shape C C···0.1mm increments Shape G K···1° increments Shape T S···0.1mm increments K···1° increments * When S≧10, X=L−S Shape R R···0.1mm increments Shape B Default R (SR)=$\frac{D}{2}$ (R···0.1mm increments possible) Refer to the working limits shown in the drawing.	3	L−10
10		11					7	70.00～200.00		4	
11		13	8				8	70.00～250.00		5	
15		15					10			6	
17		17					12			8	
—	—	20		—			15			12	
		21					16				

Alterations

Part Number	—	L	—	Tip size(C・S・K・R)	—	(KC・WKC···etc.)
RDCPN−5LR8	—	240.00	—	R0.2	—	HC4.0
RDCPJ−5LT15	—	100.00	—	S5.0−K30	—	HC7.5

Alteration details P.338

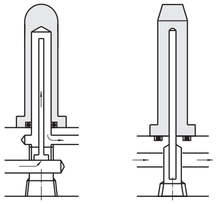
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC＜H/2	Flat cutting 0.1mm increments	Quotation
	WKC	Two flats cutting D/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC＜H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC＜H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC＜H/2 AG=1° increments 0＜AG＜360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC＜H/2		

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments D＋1≦HCC＜H−0.3	
	ZPC	O-ring groove machining (ORP refer to P.1137) Designation method: Code ZPC, O-ring (ORP) 3 H−h≧2 T≧4 No.≧W Combination with others not available.	

No.	h	t
3	6	1.4
4	7	
5	8	
6	9	
7	10	
8	11	
9	12	
10	13	
11	15	1.8
12	16	
14	18	

Price Quotation

Example

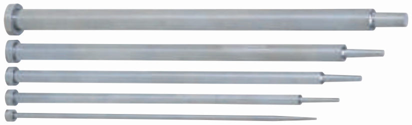


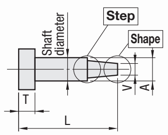
Cooling pipe　Heat transaction pipe

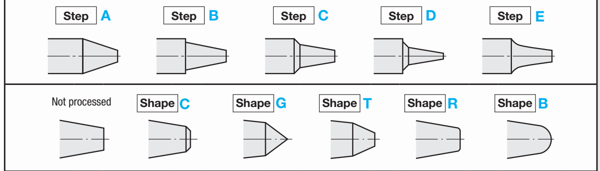
Please use cooling pipes or heat exchange pipes so as to increase cooling efficiency for the tip section of center pins.

STEPPED CENTER PINS

One-Step Center Pins







M	Head Thickness (T)	Shaft diameter tolerance	Tip (A, V) tolerance ±0.02 (Reference value): Shaft diameter (D) selection type		Tip (A, V) tolerance ±0.02 (Reference value): Shaft diameter (P) 0.01mm increments		Tip (A, V) tolerance ±0.01 (Reference value): Shaft diameter (D) selection type		Tip (A, V) tolerance ±0.01 (Reference value): Shaft diameter (P) 0.01mm increments		Tip (A, V) tolerance ±0.005 (Reference value): Shaft diameter (D) selection type		Tip (A, V) tolerance ±0.005 (Reference value): Shaft diameter (P) 0.01mm increments		Center pin shaft diameter tolerance	Applicable ejector sleeve hole (V) tolerance
SKH51 equivalent	4mm (T4)	0 −0.005	—		—		CPH−5□	P. 353	CPHG−5□	P. 357	CPV−5□	P. 353	CPVG−5□	P. 357	0 −0.005	+0.005 0
		−0.01 −0.02	CPXE−5□	P. 355	CPXGE−5□	P. 359	CPHE−5□	P. 355	CPHGE−5□	P. 359	CPVE−5□	P. 355	CPVGE−5□	P. 359	−0.01 −0.02	+0.01 0 or H7
	4・6・8mm (JIS)	0 −0.005	—		—		CPHJ−5□	P. 353	CPHJG−5□	P. 357	CPVJ−5□	P. 353	CPVJG−5□	P. 357	0 −0.005	+0.005 0
		−0.01 −0.02	CPXJE−5□	P. 355	CPXJGE−5□	P. 359	CPHJE−5□	P. 355	CPHJGE−5□	P. 359	CPVJE−5□	P. 355	CPVJGE−5□	P. 359	−0.01 −0.02	+0.01 0 or H7
SKD61 equivalent + Nitrided	4mm (T4)	* Reference tolerance −0.01 −0.02	CPN−5□	P. 361	** CPNG−5□	P. 363	CPNK−5□	P. 361	** CPNKG−5□	P. 363	—		—		−0.01 −0.02	+0.01 0 or H7
	4・6・8mm (JIS)		CPJ−5□	P. 361	** CPJG−5□	P. 363	CPJK−5□	P. 361	** CPJKG−5□	P. 363	—		—			
SKD61 equivalent + Nitrided with cooling hole	4mm (T4)	* Reference tolerance −0.01 −0.02	RDCPN−5□	P. 365	—		—		—		—		—		−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)		RDCPJ−5□	P. 365	—		—		—		—		—			
SKD61 equivalent	4mm (T4)	0 −0.005	—		—		CPP−5□	P. 367	CPPG−5□	P. 369	—		—		0 −0.005	+0.005 0
		−0.01 −0.02	CPD−5□	P. 367	CPDG−5□	P. 369	CPDK−5□	P. 367	CPDKG−5□	P. 369	—		—		−0.01 −0.02	+0.01 0 or H7

❢ The tolerance range varies depending on the selected shape. For details, refer to the catalog page of each product.

* The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the shaft size and/or length. For details, refer to the Catalog page of each product.

** For SKD61 equivalent+Nitrided, the shaft diameter is designated by 0.1 mm increments.

■ SELECTION METHOD FOR ONE-STEP CENTER PINS

■Code for One-step Center Pins Specification

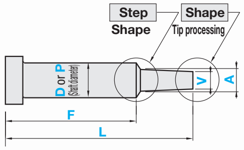
Shaft diameter (D) selection type	CP□(E) −5□□ ***RDCP□(E) −5□□
Shaft diameter (P) designation type	CP□G(E)−5□□

***A part-number of one-step center pin that starts by RD is in the type one step center pin with cooling hole.

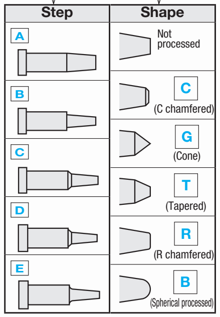
Material and tolerance codes

Shape code

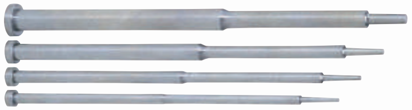
Tip process code

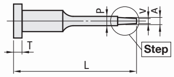


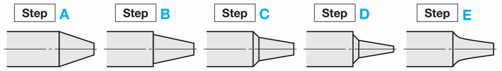
M	Head Thickness (T)	Shaft diameter tolerance	Tip (A・V) tolerance ±0.02	Tip (A・V) tolerance ±0.01	Tip (A・V) tolerance ±0.005
SKH51 equivalent	4mm (T4)	0 −0.005	—	H	V
		−0.01 −0.02	XE	HE	VE
	4・6・8mm (JIS)	0 −0.005	—	HJ	VJ
		−0.01 −0.02	XJE	HJE	VJE
SKD61 equivalent + Nitrided	4mm (T4)	*Reference tolerance −0.01 −0.02	N	NK	—
	4・6・8mm (JIS)		J	JK	—
SKD61 equivalent	4mm (T4)	0 −0.005	—	P	—
		−0.01 −0.02	D	DK	—



Stepped One-step Center Pins







M	Head Thickness (T)	Tip diameter (P) tolerance	Tip (A, V) tolerance ±0.02 (Reference value)		Tip (A, V) tolerance ±0.01 (Reference value)		Tip (A, V) tolerance ±0.005 (Reference value)		Tip diameter (P) tolerance	Applicable ejector sleeve hole (V) tolerance
SKH51 equivalent	4mm (T4)	0 −0.005	—		CPHB−5□	P.373	CPVB−5□	P.373	0 −0.005	+0.005 0
	4・6・8mm (JIS)		—		CPHBJ−5□	P.373	CPVBJ−5□	P.373	0 −0.005	+0.005 0
SKD61 equivalent + Nitrided	4mm (T4)	* Reference tolerance −0.01 −0.02	CPNB−5□	P.375	—		—		−0.01 −0.02	+0.01 0 or H7
	4・6・8mm (JIS)		CPJB−5□	P.375	—		—			

❢ The tolerance range varies depending on the selected shape. For details, refer to the catalog page of each product.

* The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the shaft size and/or length. For details, refer to the Catalog page of each product.

Two-step Center Pins・Stepped Two-step Center Pins

	Two-step	Stepped Two-step		Two-step	Stepped Two-step
Material	SKH51 equivalent	SKH51 equivalent	**Head Thickness**	4mm	4mm
Part Number	C□H5□・C□HE5□	C□HB5□	**Tip tolerance**	±0.01	±0.01
Page	P.371	P.377	**Delivery**	3 Ⓐ	3 Ⓐ

Center Pins with Cooling Hole

Material	SKD61 equivalent+Nitrided	**Head Thickness**	4mm(T4) 6・8mm(JIS)
Part Number	RDCPN−5□ RDCPJ−5□	**Tip tolerance**	±0.02
Page	P.365	**Delivery**	5

■Material characteristics of center pins

	M	High Speed Steel SKH51 (M2) (1.3343)	Dies Steel SKD61 (H13) (1.2344) + Nitrided	Dies Steel SKD61 (H13) (1.2344)
	H HRC	58～60	Surface : 900HV～ Base Material : 40～45	50～55
Machining characteristics	Wear resistance	5	4	4
	Ability to be mirror-finished	4	3	4
	Toughness	3	4	5
	Corrosion resistance	3	3	3
Physical characteristics	Density [g/cm³]	8.2	7.75	7.75
	Modulus of longitudinal elasticity [kgf/mm²]	22300	21000	21000
	Coefficient of thermal expansion [×10⁶/℃]	10.1	10.8	10.8
	Thermal conductivity [cal/cm・sec・℃]	0.051	0.061	0.061
Mechanical characteristics	Tensile strength [kgf/mm²]	235	135	135
	Charpy impact value [kgf・m/cm²]	2	4	6

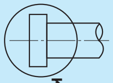
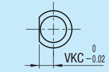
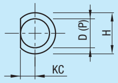
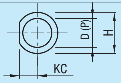
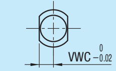
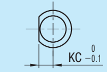
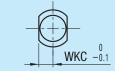
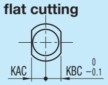
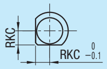
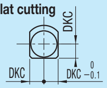
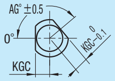
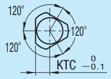
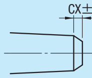
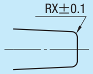
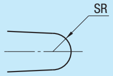
Machining characteristics 1 (Poor) 3 (Good) 5 (Excellent)

Conversion formula
$1kgf/mm^2 = 9.81N/mm^2$
$1cal/cm \cdot sec \cdot ℃ = 418.6W/M.K$
$1kgf \cdot m/cm^2 = 9.81J/cm^2$

❢ Use these data for reference only as they are dependent on specific heat treatment and usage conditions.

ALTERATION GUIDE FOR STEPPED CENTER PINS

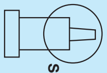
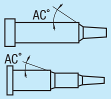
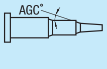
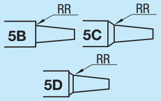
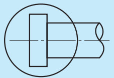
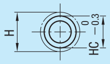
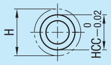
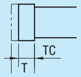
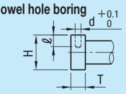
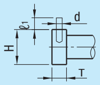
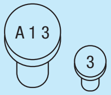
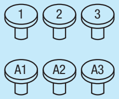
■Alteration Guide for Stepped Center Pins

Items	Applicable Products	Alterations	Codes	Specifications		1Code
 **Key flat cutting**	**One-step・Two-step Center Pins** **Stepped One-step・Two-step Center Pins**	Key flat cutting (precision) 	**VKC**	Single flat cutting (precision) ❗ High speed steel SKH51 equivalent only Range of designation (DorP)/2≦VKC＜H/2	To make a flat at the shaft diameter position for both shaft diameter (One-step・Two-step) shaft diameter (stepped type)  Unit of designation ・One-step・Two-step Shaft diameter selection type (D/2)……0.05mm increments possible (0.01mm increments) type (P/2)……0.005mm increments possible (0.1mm increments) type (P/2)……0.05mm increments possible ・Stepped Type (D/2)……………0.05mm increments possible Designation method ・VKC2.82 (When P5.64) ・VWC3.375 (When P6.75) ・KC2.61 (When P5.22) ・WKC3.085 (When P6.17) ・RKC2.74 (When P5.48) ・DKC3 (When D6) ・KGC1.5—AG125 (When D3) ・KTC3.085 (When P6.17) To designate an arbitrary flat size  Unit of designation : 0.1mm increments Designation method ・VKC1.4 ・VWC2.3 ・KC1.4 ・WKC2.3 ・KAC1.4—KBC1.6 ・RKC1.4 ・DKC1.75 ・KGC1.4—AG85 ・KTC2.3	Quotation
		Key flat cutting (precision) 	**VWC**	Two flats cutting (precision) ❗ High speed steel SKH51 equivalent only Range of designation (DorP)/2≦VWC＜H/2		
		Key flat cutting 	**KC**	Single flat cutting Range of designation (DorP)/2≦KC＜H/2		
		Key flat cutting 	**WKC**	Two flats cutting Range of designation (DorP)/2≦WKC＜H/2		
		Key flat cutting 	**KAC** **KBC**	Varied width parallel flats cutting Range of designation (DorP)/2≦KAC KAC＜KBC＜H/2		
		Key flat cutting 	**RKC**	Two flats (right angled) cutting Range of designation (DorP)/2≦RKC＜H/2		
		Key flat cutting 	**DKC**	Three flats cutting Range of designation (DorP)/2≦DKC＜H/2		
		Key flat cutting (angled) 	**KGC**	Adds a flat at the reference plane (0˚), and another at the designated angle from there. Range of designation (DorP)/2≦KGC＜H/2 AG＝1˚ increments 0˚＜AG＜360˚		
		Key flat cutting (angled) 	**KTC**	Three flats cutting at 120˚ Range of designation (DorP)/2≦KTC＜H/2		
Tip processing	**Two-step Center Pins** **Stepped One-step・Two-step Center Pins**		**CX**	Performs C chamfering on the tip. Range of designation 0.3≦CX≦0.5 ❗ α＝CX V (E) is a dimension prior to CX machining ❗ Available when DorP≧2 ❗ CX＜V/2 or E/2	Unit of designation 0.1mm increments Designation method CX0.5	
			**RX**	Performs R chamfering on the tip. Range of designation (DorP)≦4.5 0.3≦RX≦0.5 ❗ α＝RX (DorP)＞4.5 0.3≦RX≦1.0 V (E) is a dimension prior to RX machining ❗ Available when DorP≧2 ❗ RX＜V/2 or E/2	Unit of designation RX＝0.1mm increments Designation method RX0.5	
			**SR**	Finishes the top in spherical shape (SR). ❗ α＝V/2 V (E) is a dimension prior to SR machining. ❗ Available when DorP≧2	Designation method SR	

❗ Note that designating H/2—0.15 or more for key flat cutting alteration will create hardly any flat on the head.

❗ Tip process (CX/RX/SR) of one-step center pin is integrated into tip shape (shape C R B).

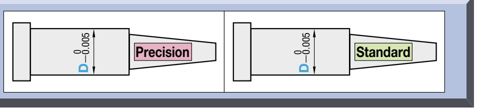
■Alteration Guide for Stepped Center Pins

Items	Applicable Products	Alterations	Codes	Specifications		1Code
 **Step alteration**	One-step・Two-step Center Pins Stepped One-step・Two-step Center Pins Step **C** Step **D**		**AC**	Changes the standard angle (Ks＝45˚) within 30˚≦AC≦60˚ range. Range of designation 30˚≦AC≦60˚ Step Working limits for Shape D A＋2(C×tanAC˚)＜(DorP) (except for two-step) ❗ Available when C≦1.0	Unit of designation 1˚ increments Designation method AC40 ⊗ Combination with RR not available	Quotation
	Two-step Center Pins Stepped Two-step Center Pins Step **C** Step **D**		**AGC**	Changes the standard angle (Ks＝45˚) within 30˚ ≦AGC≦60˚ range. Range of designation 30˚ ≦AGC≦60˚ Step Working limits for Shape D J＋2 (G×tanAGC˚)＜V	Unit of designation 1˚ increments Designation method AGC60 ⊗ Combination with RR not available	
	One-step・Two-step Center Pins Stepped One-step・Two-step Center Pins Step **B** Step **C** Step **D**		**RR**	Changes R (normally 0.2 or less) to R0.3～0.5 (Strength has been improved) Designation method RR ❗ Available for Step B・C・D ❗ D (P)—A≧1.0 ❗ Step D, C≧0.5		
 **Head alteration**	**One-step・Two-step Center Pins** **Stepped One-step・Two-step Center Pins**	**Head diameter change** 	**HC**	Reduces the head diameter. Range of designation DorP≦HC＜H ❗ Available when DorP≧1.5 ❗ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Unit of designation 0.1mm increments Designation method HC6.5	
		Head diameter change (precision) 	**HCC**	Reduces the head diameter. (precision) Range of designation DorP＋0.5≦HCC＜H—0.3 ❗ Available when DorP≧1.5	Unit of designation 0.1mm increments Designation method HCC6.1	
		Head thickness change 	**TC**	Reduces the head thickness. Dimensions L,Y,F and N remain unchanged. Range of designation T/2≦TC＜T ❗ T—TC≦Lmax.—L ❗ Available when DorP≧1.5	Unit of designation 0.1mm increments Designation method TC3.5	
		Dowel hole boring 	**NC**	Adds a dowel hole. ❗ Available when head diameter (H)≧4 T｜d｜ℓ 4｜2｜3 6｜3｜5 8 ⊗ Combination with other than NHC・NHN・CX・RX・SR・AC・RR not available.	Designation method NC	
		Dowel hole＋Spring pin 	**NCW**	Adds a dowel hole and drives a spring pin. ❗ Available when head diameter (H)≧4 T｜d｜ℓ₁ 4｜2｜5 6｜3 8 ⊗ Combination with other than NHC・NHN・CX・RX・SR・AC・RR not available.	Designation method NCW	
		Numbering 	**NHC**	Numbering on the head Electrolytic marking of ID code on the head(in 5 point, Round Gothic type). Available characters Numerals: 0～9; Alphabets: A～Z Range of designation 1 character when 2≦H＜4.9 1 or 2 characters when 5≦H＜6.9 (Only the first character may be an alphabet.) Up to 3 characters when 7≦H (Only the first character may be an alphabet.) Designation method NHC—6 NHC—23 NHC—A90 ❗ Available when head diameter H≧2		
		Numbering 	**NHN**	Automatic sequential numbering on the head Adds a sequential number on the head of each ejector pin when two or more pieces of an identical size are ordered. Available characters Same as NHC (see above) Range of designation Same as NHC (see above) Designation method When 3 pieces are ordered with NHN—1, a sequential number starting from 1 is added on the head of each piece. When 10 pieces are ordered with NHN—A15, a sequential number starting from A15 (through A24) is added on the head of each piece. ❗ Available when head diameter (H)≧2 ❗ Only available when two or more pieces of an identical size are ordered.		

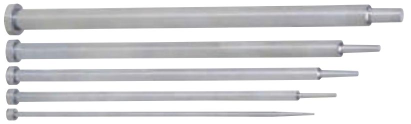
High Speed Steel
SKH51 equivalent
D $^{0}_{-0.005}$

ONE-STEP CENTER PINS

—SHAFT DIAMETER (D) SELECTION TIP (A・V) TOLERANCE : ±0.005／±0.01 TYPE—


D $^{0}_{-0.005}$
Precision
D $^{0}_{-0.005}$
Standard

Refer to shaft diameter designation type P.357 when shaft diameter is designated.

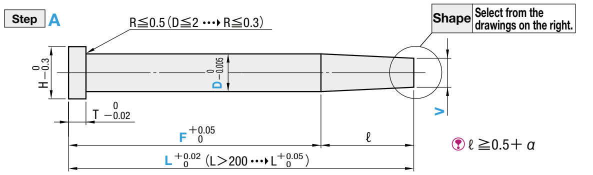


M SKH51 equivalent　Range of guaranteed shaft diameter precision (Details P.1305)
H 58～60HRC　Range of guaranteed base material hardness (Details P.1307)

Type	T D	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPH −5	$^{0}_{-0.005}$	4mm (T4)	$^{+0.005}_{0}$ Please note that the usage of center pins of shaft diameter tolerance $^{0}_{-0.005}$ and ejector sleeves of V dimension tolerance $^{+0.01}_{0}$ and H7 is inappropriate since the fit length is too long. Details P.1309
CPV −5			
CPHJ−5		4・6・8mm(JIS)	
CPVJ−5			

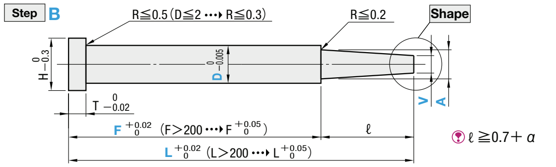
Step (Step type) Select from A～E in the drawings below

Step A


R≦0.5(D≦2 ···▸R≦0.3)
Shape Select from the drawings on the right.
H −0.3
D −0.005
T $^{0}_{-0.02}$
F $^{+0.05}_{0}$
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
V

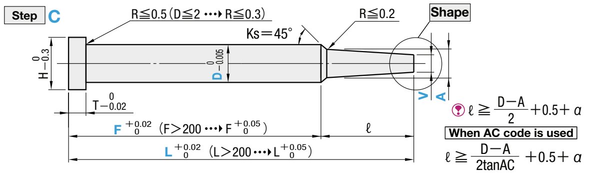
ℓ≧0.5+α

Step B


R≦0.5(D≦2 ···▸R≦0.3)
R≦0.2
Shape
H −0.3
D −0.005
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
V
A

ℓ≧0.7+α

Step C

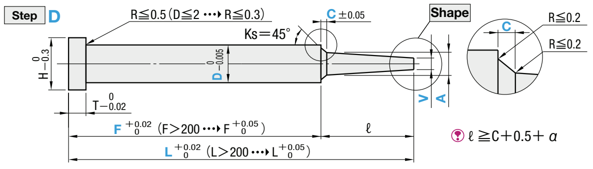

R≦0.5(D≦2 ···▸R≦0.3)
R≦0.2
Ks=45°
Shape
H −0.3
D −0.005
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
V
A

$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

When AC code is used

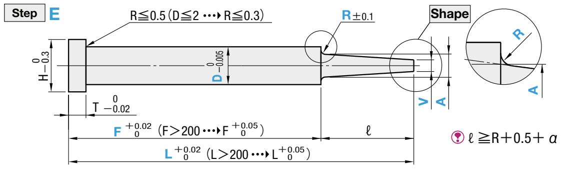
$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$

Step D


R≦0.5(D≦2 ···▸R≦0.3)
C±0.05
Ks=45°
Shape
R≦0.2
R≦0.2
C
H −0.3
D −0.005
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
V
A

ℓ≧C+0.5+α

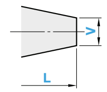
Step E


R≦0.5(D≦2 ···▸R≦0.3)
R±0.1
Shape
R
A
H −0.3
D −0.005
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
V
A

ℓ≧R+0.5+α

Shape (Tip shape : V is dimension before tip processing.)

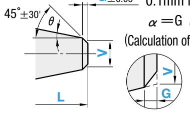
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

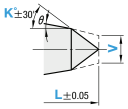
α=0

C (C chamfered)


45°±30'
θ
G±0.05
V
L
V
G

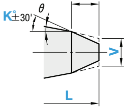
0.5≦G<V/2
0.1mm increments
α=G θ<45°
(Calculation of θ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha = \frac{V}{2\tan K}$ θ<K
(Calculation of θ P.1315)

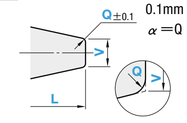
T (Tapered)


S±0.05
K°±30'
θ
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

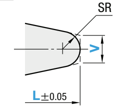
20<K≦45
1° increments
α=S θ<K
(Calculation of θ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

Group	Type		Step (Step type A・V・Ks) T							
			Step A	Step B	Step C		Step D		Step E	
	4mm head	JIS head	V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPH−5□	CPHJ−5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°	±0.02	±0.01
Precision	CPV−5□	CPVJ−5□	±0.005	±0.005	±0.005	±30'	±0.005	±30'		±0.005

Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	Shape	D	0.01mm increments L	F	A	Vmin.	0.1mm increments C・R	ℓ max.
3	4	3	4	CPH−5 CPV−5	CPHJ−5 CPVJ−5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1	70.00～200.00	F≧50.00	D>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{D-A}{2}$ Step E only R≧0.3 and $R \leqq \frac{D-A}{2}$	15
								1.5	70.00～250.00					20
4		4						2				0.70		25
5		5						2.5						30
6		6						3	70.00～300.00			1.00		35
7		7						3.5						40
		8	6					4						45
8								4.5				1.50		50
		9						5	70.00～350.00					
9								5.5				2.00		
		10						6						
10		11						6.5						
								7						
11		13	8					8						
14		14						9						
15		15						10						
17		17						12						

Step E is D≧1.5　Refer to the drawing for ℓ min. (normally, α=0)

Order

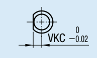
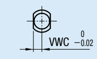
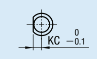
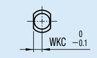
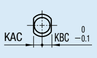
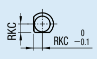
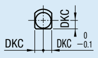
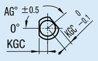
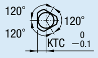
Part Number — L — F — A — V — C(R) — Tip size (K・S・G・Q)
CPH−5EC 6 — 350.00 — F330.00 — A5.00 — V4.50 — R0.5 — G2.0

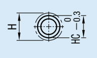
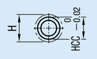
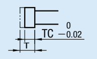
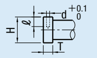
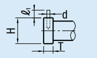
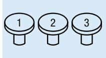
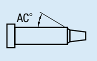
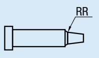
Days to Ship　Quotation

Alterations

Part Number — L — F — A — V — C(R) — Tip size (K・S・G・Q) — (KC・WKC···etc.)
CPH−5EC 6 — 350.00 — F330.00 — A5.00 — V4.50 — R0.5 — G2.0 — KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

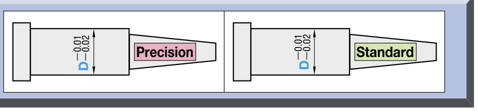
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H, D≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T−TC≦Lmax.−L (Dimensions L and F remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ1: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B・C・D D−A≧1.0 When Step D, C≧0.5	

Price　Quotation

High Speed Steel
SKH51 equivalent
$D^{-0.01}_{-0.02}$

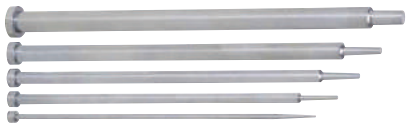
ONE-STEP CENTER PINS

—SHAFT DIAMETER (D) SELECTION TIP (A・V) TOLERANCE±0.005／±0.01／±0.02 TYPE—


$D^{-0.01}_{-0.02}$
Precision
$D^{-0.01}_{-0.02}$
Standard

Refer to shaft diameter designation type P.359 when shaft diameter is designated.

Non JIS material definition is listed on P.1351 - 1352



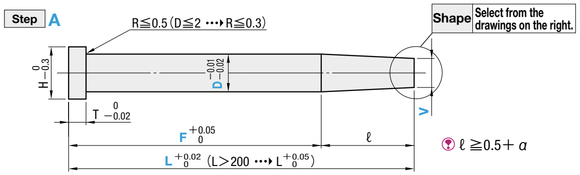
RoHS

M SKH51 equivalent Range of guaranteed shaft diameter precision (Details P.1305)
H 58～60HRC Range of guaranteed base material hardness (Details P.1307)

Type	**T** D	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPXE−5	−0.01 −0.02	4mm (T4)	$^{+0.01}_{0}$ or H7 Details P.1309
CPHE−5			
CPVE−5			
CPXJE−5		4・6・8mm(JIS)	
CPHJE−5			
CPVJE−5			

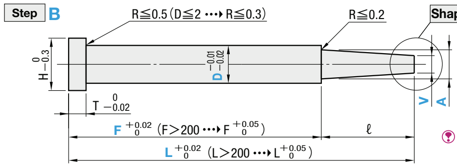
Step (Step type) Select from A～E in the drawings below

Step A


R≦0.5 (D≦2 ···▸ R≦0.3)
Shape
Select from the drawings on the right.
$H^{0}_{-0.3}$
$D^{-0.01}_{-0.02}$
$T^{0}_{-0.02}$
$F^{+0.05}_{0}$
ℓ
$L^{+0.02}_{0}$ (L>200 ···▸ $L^{+0.05}_{0}$)
V

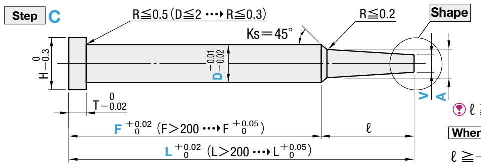
ℓ≧0.5+α

Step B


R≦0.5 (D≦2 ···▸ R≦0.3)
R≦0.2
Shape
$H^{0}_{-0.3}$
$D^{-0.01}_{-0.02}$
$T^{0}_{-0.02}$
$F^{+0.02}_{0}$ (F>200 ···▸ $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···▸ $L^{+0.05}_{0}$)
V
A

ℓ≧0.7+α

Step C

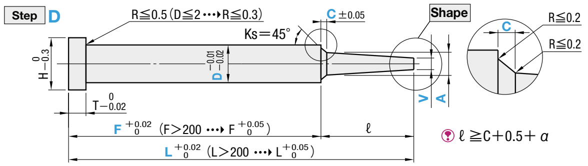

R≦0.5 (D≦2 ···▸ R≦0.3)
Ks=45°
R≦0.2
Shape
$H^{0}_{-0.3}$
$D^{-0.01}_{-0.02}$
$T^{0}_{-0.02}$
$F^{+0.02}_{0}$ (F>200 ···▸ $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···▸ $L^{+0.05}_{0}$)
V
A

$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

When AC code is used

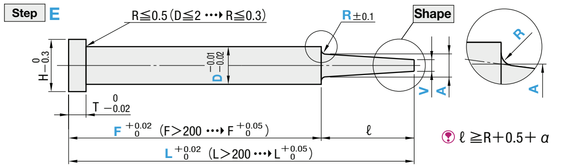
$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$

Step D


R≦0.5 (D≦2 ···▸ R≦0.3)
C±0.05
Ks=45°
Shape
R≦0.2
C
R≦0.2
$H^{0}_{-0.3}$
$D^{-0.01}_{-0.02}$
$T^{0}_{-0.02}$
$F^{+0.02}_{0}$ (F>200 ···▸ $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···▸ $L^{+0.05}_{0}$)
V
A

ℓ≧C+0.5+α

Step E

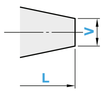

R≦0.5 (D≦2 ···▸ R≦0.3)
R±0.1
Shape
R
A
$H^{0}_{-0.3}$
$D^{-0.01}_{-0.02}$
$T^{0}_{-0.02}$
$F^{+0.02}_{0}$ (F>200 ···▸ $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···▸ $L^{+0.05}_{0}$)
V
A

ℓ≧R+0.5+α

Shape (Tip shape : V is dimension before tip processing.)

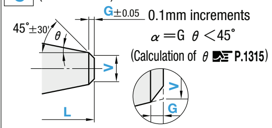
(Not processed)

Designation of the shape is unnecessary when tip processing is not required.



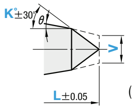
α=0

C (C chamfered)


G±0.05
45°±30'
θ
V
L
V
G

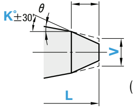
0.5≦G<V/2
0.1mm increments
α=G θ<45°
(Calculation of θ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K}$ θ<K
(Calculation of θ P.1315)

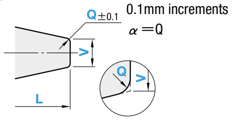
T (Tapered)


S±0.05
K°±30'
θ
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

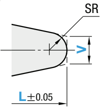
20<K≦45
1° increments
α=S θ<K
(Calculation of θ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

Group	Type		Step (Step type A・V・Ks) T							
			Step A	Step B	Step C		Step D		Step E	
	4mm head	JIS head	V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPXE−5□	CPXJE−5□	±0.02	±0.02	±0.02	±1°	±0.02	±1°	±0.02	±0.02
	CPHE−5□	CPHJE−5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°		±0.01
Precision	CPVE−5□	CPVJE−5□	±0.005	±0.005	±0.005	±30'	±0.005	±30'		±0.005

4mm head		JIS head		Part Number					0.01mm increments				0.1mm increments	ℓ
				Type		Step	Shape	D						
H	T	H	T	4mm head	JIS head				L	F	A	Vmin.	C・R	max.
3	4	3	4	CPXE−5 CPHE−5 CPVE−5	CPXJE−5 CPHJE−5 CPVJE−5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1	70.00～200.00	F≧50.00	D>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{D-A}{2}$ Step E only R≧0.3 and $R \leqq \frac{D-A}{2}$	15
								1.5	70.00～250.00					20
4		4						2				0.70		25
5		5						2.5						30
6		6						3	70.00～300.00			1.00		35
7		7						3.5						40
		8	6					4						45
8								4.5				1.50		50
		9						5	70.00～350.00					
9								5.5				2.00		
		10						6						
10		11						6.5						
								7						
11		13	8					8						
14		14						9						
15		15						10						
17		17						12						

Step E is D≧1.5 Refer to the drawing for ℓ min. (normally, α=0)

Order

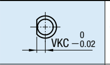
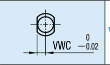
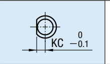
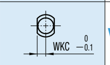
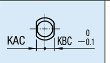
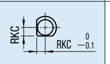
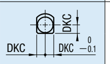
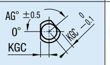
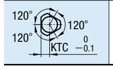
Part Number — L — F — A — V — C(R) — Tip size (K・S・G・Q)
CPHE−5EG 6 — 350.00 — F330.00 — A5.00 — V4.50 — R0.5 — K4.5

Days to Ship Quotation

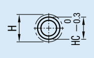
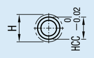
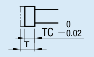
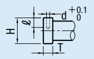
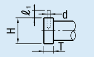
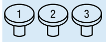
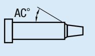
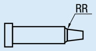
Alterations

Part Number — L — F — A — V — C(R) — Tip size (K・S・G・Q) — (KC・WKC···etc.)
CPHE−5EG 6 — 350.00 — F330.00 — A5.00 — V4.50 — R0.5 — K45 — KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2		Quotation
	VWC	Two flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

$VKC^{0}_{-0.02}$
$VWC^{0}_{-0.02}$
$KC^{0}_{-0.1}$
$WKC^{0}_{-0.1}$
KAC
$KBC^{0}_{-0.1}$
RKC
$RKC^{0}_{-0.1}$
DKC
DKC
$DKC^{0}_{-0.1}$
AG° ±0.5
0°
KGC
$KGC^{0}_{-0.1}$
120°
120°
120°
$KTC^{0}_{-0.1}$

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H, D≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T−TC≦Lmax.−L (Dimensions L and F remain unchanged)	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ₁: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B・C・D D−A≧1.0 When Step D, C≧0.5	

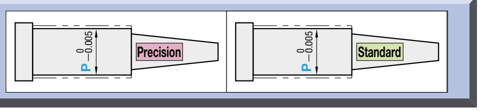
H
$HC^{0}_{-0.3}$
H
$HCC^{0}_{-0.02}$
$TC^{0}_{-0.02}$
T
H
ℓ
$d^{+0.1}_{0}$
T
H
ℓ₁
d
T
217
1
2
3
AC°
RR

Price Quotation

High Speed Steel
SKH51 equivalent
$P^{0}_{-0.005}$

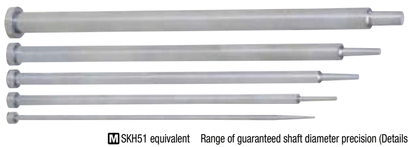
ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A・V) TOLERANCE : ±0.005／±0.01 TYPE—


Precision
Standard
$P^{0}_{-0.005}$

Non JIS material definition is listed on P.1351 - 1352

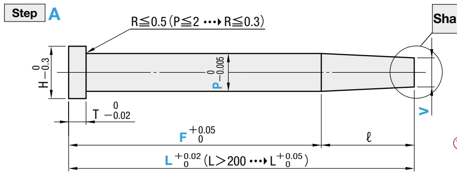
For shaft diameter selection type, refer to P.353.



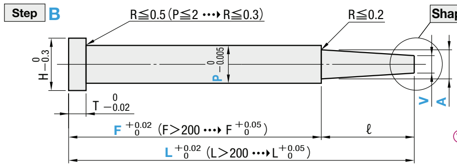
M SKH51 equivalent　Range of guaranteed shaft diameter precision (Details P.1305)
H 58～60HRC　Range of guaranteed base material hardness (Details P.1307)

Type	T P	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPHG —5	$^{0}_{-0.005}$	4mm (T4)	$^{+0.005}_{0}$ Please note that the usage of center pins of shaft diameter tolerance $^{0}_{-0.005}$ and ejector sleeves of V dimension tolerance $^{+0.01}_{0}$ and H7 is inappropriate since the fit length is too long. Details P.1309
CPVG —5			
CPHJG—5		4・6・8mm(JIS)	
CPVJG—5			

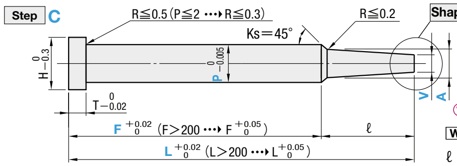
Step (Step type) Select from A～E in the drawings below


Step A
R≦0.5 (P≦2 ···› R≦0.3)
Shape Select from the drawings on the right.
$H^{0}_{-0.3}$
$P^{0}_{-0.005}$
$T^{0}_{-0.02}$
V
$F^{+0.05}_{0}$
ℓ
$L^{+0.02}_{0}$ (L>200 ···› $L^{+0.05}_{0}$)

$\ell \geqq 0.5+\alpha$


Step B
R≦0.5 (P≦2 ···› R≦0.3)
R≦0.2
Shape
$H^{0}_{-0.3}$
$P^{0}_{-0.005}$
$T^{0}_{-0.02}$
V
A
$F^{+0.02}_{0}$ (F>200 ···› $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···› $L^{+0.05}_{0}$)

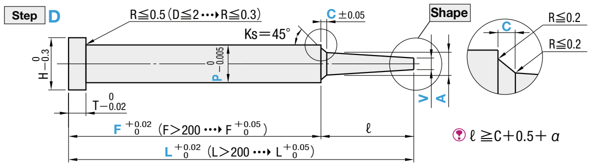
$\ell \geqq 0.7+\alpha$


Step C
R≦0.5 (P≦2 ···› R≦0.3)
Ks=45°
R≦0.2
Shape
$H^{0}_{-0.3}$
$P^{0}_{-0.005}$
$T^{0}_{-0.02}$
V
A
$F^{+0.02}_{0}$ (F>200 ···› $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···› $L^{+0.05}_{0}$)

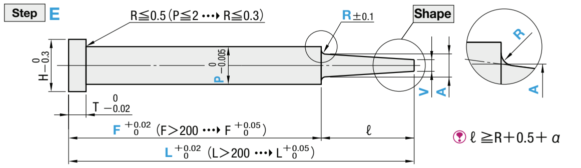
$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$


Step D
R≦0.5 (D≦2 ···› R≦0.3)
Ks=45°
C±0.05
Shape
R≦0.2
R≦0.2
C
$H^{0}_{-0.3}$
$P^{0}_{-0.005}$
$T^{0}_{-0.02}$
V
A
$F^{+0.02}_{0}$ (F>200 ···› $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···› $L^{+0.05}_{0}$)

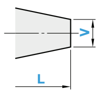
$\ell \geqq C+0.5+\alpha$


Step E
R≦0.5 (P≦2 ···› R≦0.3)
R±0.1
Shape
R
A
$H^{0}_{-0.3}$
$P^{0}_{-0.005}$
$T^{0}_{-0.02}$
V
A
$F^{+0.02}_{0}$ (F>200 ···› $F^{+0.05}_{0}$)
ℓ
$L^{+0.02}_{0}$ (L>200 ···› $L^{+0.05}_{0}$)

$\ell \geqq R+0.5+\alpha$

Shape (Tip shape : V is dimension before tip processing.)

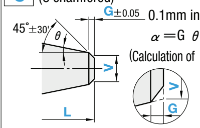
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

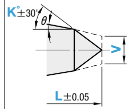
$\alpha=0$

C (C chamfered)


45°±30'
θ
G±0.05
V
L
V
G

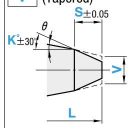
0.5≦G<V/2
0.1mm increments
$\alpha=G$　$\theta<45°$
(Calculation of θ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K}$　$\theta<K$
(Calculation of θ P.1315)

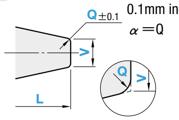
T (Tapered)


S±0.05
θ
K°±30'
V
L

$0.1\leqq S<\frac{V}{2\tan K}$
0.1mm increments

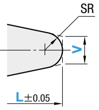
20<K≦45
1° increments
$\alpha=S$　$\theta<K$
(Calculation of θ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
$\alpha=Q$

B (Spherical processed)



$\alpha=V/2$

Group	Type		Step (Step type A・V・Ks) T							
			Step A	Step B	Step C		Step D		Step E	
	4mm head	JIS head	V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPHG—5□	CPHJG—5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°	±0.02	±0.01
Precision	CPVG—5□	CPVJG—5□	±0.005	±0.005	±0.005	±30'	±0.005	±30'		±0.005

4mm head		JIS head		Part Number					0.01mm increments					0.1mm increments	ℓ
				Type		Step	Shape	No.							
H	T	H	T	4mm head	JIS head				L	P	F	A	Vmin.	C・R	max.
3	4	3	4	CPHG—5 CPVG—5	CPHJG—5 CPVJG—5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1	70.00～150.00	0.80～ 0.89	F≧50.00	P>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{P-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{P-A}{2}$	15
									70.00～200.00	0.90～ 0.99					
								1.5	70.00～250.00	1.00～ 1.49					20
4		4						2	70.00～300.00	1.50～ 1.99			0.70		25
5		5						2.5		2.00～ 2.49					30
6		6						3	70.00～300.00	2.50～ 2.99			1.00		35
7		7						3.5		3.00～ 3.49					40
		8	6					4		3.50～ 3.99					45
8								4.5		4.00～ 4.49			1.50		50
		9						5	70.00～350.00	4.50～ 4.99					
9								5.5		5.00～ 5.49			2.00		
		10						6		5.50～ 5.99					
10		11						6.5		6.00～ 6.49					
								7		6.50～ 6.99					
11		13	8					8		7.00～ 7.99					
15		15						10		8.00～ 9.99					
17		17						12		10.00～11.99					

Shape C・G・T・R・B is No.1.5 (P≧1.00)～　Step E is No.1.5 (P≧1.10)～　Refer to the drawing for ℓ min. (normally, $\alpha=0$)

Order

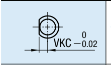
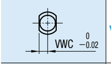
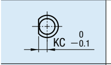
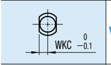
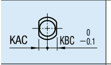
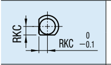
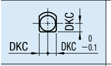
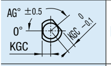
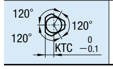
Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)
CPHG—5EB 6	—	350.00	—	P5.95	—	F330.00	—	A5.00	—	V4.50	—	R0.5		

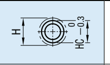
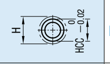
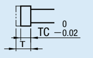
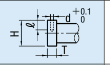
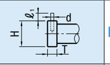
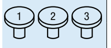
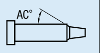
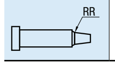
Days to Ship　Quotation

Alterations

Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPHG—5E 6	—	350.00	—	P5.95	—	F330.00	—	A5.00	—	V4.50	—	R0.5			—	KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two flats cutting (precision) P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120 ° P/2≦KTC<H/2		

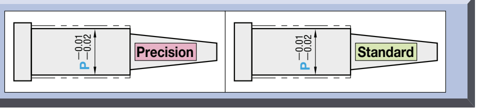
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P≦HC<H, P≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 T−TC≦Lmax.−L (Dimensions L and F remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T | d | ℓ 4 | 2 | 3 6, 8 | 3 | 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T | d | ℓ1 4 | 2 | 5 6, 8 | 3 | 5	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments　30≦AC≦60 Available for Step C・D　⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<P	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B・C・D P−A≧1.0　When Step D, C≧0.5	

Price　Quotation

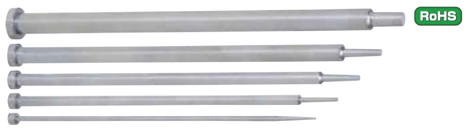
High Speed Steel
SKH51 equivalent
$P^{-0.01}_{-0.02}$

ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A • V) TOLERANCE : ±0.005／±0.01／±0.02 TYPE—


P −0.01 −0.02
Precision
P −0.01 −0.02
Standard

For shaft diameter selection type, refer to P.355.

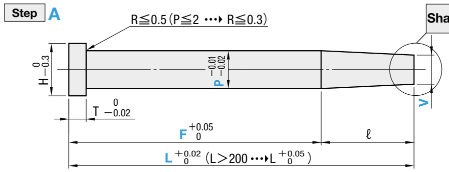


M SKH51 equivalent — Range of guaranteed shaft diameter precision (Details P.1305)
H 58～60HRC — Range of guaranteed base material hardness (Details P.1307)

Type	**T** P	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPXGE−5	−0.01 −0.02	4mm (T4)	$^{+0.01}_{0}$ or H7 Details P.1309
CPHGE−5			
CPVGE−5			
CPXJGE−5		4・6・ 8mm(JIS)	
CPHJGE−5			
CPVJGE−5			

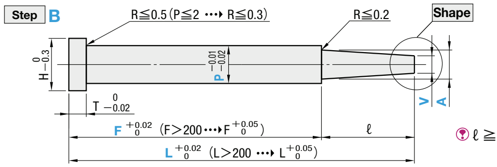
Step (Step type) Select from A～E in the drawings below

Step A


R≦0.5 (P≦2 ···▸ R≦0.3)
Shape Select from the drawings on the right.
H −0.3 0
P −0.01 −0.02
T 0 −0.02
F +0.05 0
ℓ
L +0.02 0 (L>200 ···▸ L +0.05 0)
V

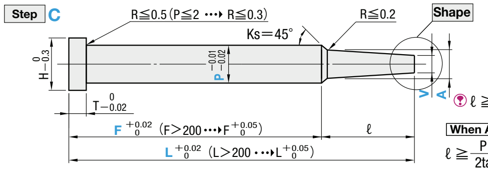
$\ell \geqq 0.5+\alpha$

Step B


R≦0.5 (P≦2 ···▸ R≦0.3)
R≦0.2
Shape
H −0.3 0
P −0.01 −0.02
T 0 −0.02
F +0.02 0 (F>200 ···▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ···▸ L +0.05 0)
V
A

$\ell \geqq 0.7+\alpha$

Step C

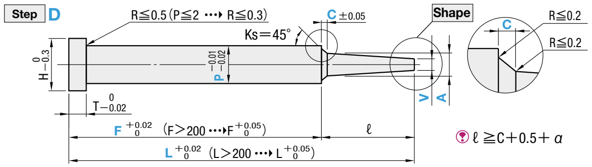

R≦0.5 (P≦2 ···▸ R≦0.3)
Ks=45°
R≦0.2
Shape
H −0.3 0
P −0.01 −0.02
T 0 −0.02
F +0.02 0 (F>200 ···▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ···▸ L +0.05 0)
V
A

$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

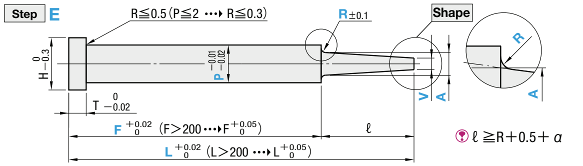
$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

Step D


R≦0.5 (P≦2 ···▸ R≦0.3)
C ±0.05
Ks=45°
Shape
R≦0.2
R≦0.2
C
H −0.3 0
P −0.01 −0.02
T 0 −0.02
F +0.02 0 (F>200 ···▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ···▸ L +0.05 0)
V
A

$\ell \geqq C+0.5+\alpha$

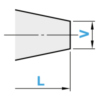
Step E


R≦0.5 (P≦2 ···▸ R≦0.3)
R ±0.1
Shape
R
H −0.3 0
P −0.01 −0.02
T 0 −0.02
F +0.02 0 (F>200 ···▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ···▸ L +0.05 0)
V
A

$\ell \geqq R+0.5+\alpha$

Shape (Tip shape : V is dimension before tip processing.)

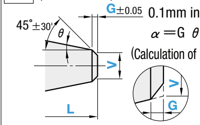
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

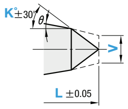
$\alpha=0$

C (C chamfered)


G ±0.05
45° ±30'
θ
V
L
V
G

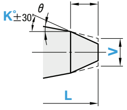
$0.5 \leqq G < V/2$
0.1mm increments
$\alpha = G \quad \theta < 45^\circ$
(Calculation of θ P.1315)

G (Cone)



$20 < K \leqq 60$
1° increments
$\alpha = \frac{V}{2\tan K} \quad \theta < K$
(Calculation of θ P.1315)

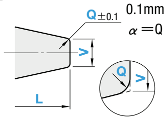
T (Tapered)


S ±0.05
θ
K° ±30'
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

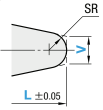
$20 < K \leqq 45$
1° increments
$\alpha = S \quad \theta < K$
(Calculation of θ P.1315)

R (R chamfered)



$0.2 \leqq Q < V/2$
0.1mm increments
$\alpha = Q$

B (Spherical processed)



$\alpha = V/2$

Group	Type		Step (Step type A・V・Ks) T							
			Step A	Step B	Step C		Step D		Step E	
	4mm head	JIS head	V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPXGE−5□	CPXJGE−5□	±0.02	±0.02	±0.02	±1°	±0.02	±1°	±0.02	±0.02
	CPHGE−5□	CPHJGE−5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°		±0.01
Precision	CPVGE−5□	CPVJGE−5□	±0.005	±0.005	±0.005	±30'	±0.005	±30'		±0.005

Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number					0.01mm increments					0.1mm increments	ℓ
				Type		Step	Shape	No.	L	P	F	A	Vmin.	C・R	max.
H	T	H	T	4mm head	JIS head										
3	4	3	4	CPXGE−5 CPHGE−5 CPVGE−5	CPXJGE−5 CPHJGE−5 CPVJGE−5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1	70.00～150.00	0.80～ 0.99	F≧50.00	P>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{P-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{P-A}{2}$	15
									150.01～200.00	0.90～ 0.99					
								1.5	70.00～250.00	1.00～ 1.49					20
4		4						2		1.50～ 1.99			0.70		25
5		5						2.5		2.00～ 2.49					30
6		6						3	70.00～300.00	2.50～ 2.99			1.00		35
7		7						3.5		3.00～ 3.49					40
		8	6					4		3.50～ 3.99					45
8								4.5		4.00～ 4.49			1.50		50
		9						5	70.00～350.00	4.50～ 4.99					
9								5.5		5.00～ 5.49			2.00		
		10						6		5.50～ 5.99					
10		11						6.5		6.00～ 6.49					
								7		6.50～ 6.99					
11		13	8					8		7.00～ 7.99					
15		15						10		8.00～ 9.99					
17		17						12		10.00～11.99					

Shape C・G・T・R・B is No.1.5 (P≧1.0)～ Step E is No.1.5 (P≧1.10)～ Refer to the drawing for ℓ min. (normally, α=0)

Order

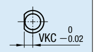
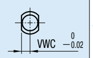
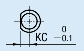
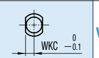
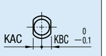
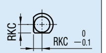
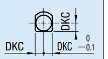
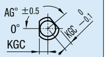
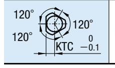
Part Number	L	P	F	A	V	C(R)	Tip size (K・S・G・Q)
CPHGE−5ET 6	350.00	P5.95	F330.00	A5.00	V4.50	R0.5	K35 − S1.0

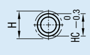
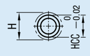
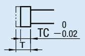
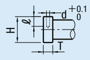
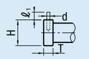
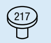
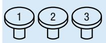
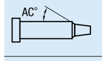
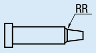
Days to Ship Quotation

Alterations

Part Number	L	P	F	A	V	C(R)	Tip size (K・S・G・Q)	(KC・WKC···etc.)
CPHGE−5ET 6	350.00	P5.95	F330.00	A5.00	V4.50	R0.5	K35−S1.0	KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two flats cutting (precision) P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

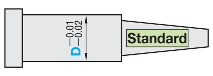
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P≦HC<H, P≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 T−TC≦Lmax.−L (Dimensions L and F remain unchanged)	
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ_1: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<P	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B・C・D P−A≧1.0 When Step D, C≧0.5	

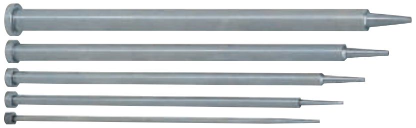
Price Quotation

Dies Steel
SKD61 equivalent+Nitrided
D$^{-0.01}_{-0.02}$

ONE-STEP CENTER PINS

—SHAFT DIAMETER (D) SELECTION TIP (A・V) TOLERANCE : ±0.01／±0.02 TYPE—


D$^{-0.01}_{-0.02}$
Standard



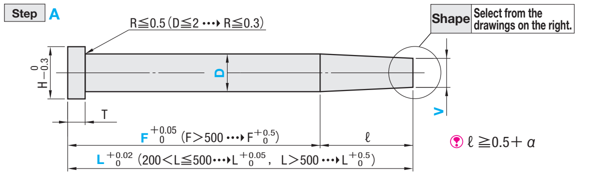
M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40~45HRC

Range of guaranteed shaft diameter precision (Details ☞ P.1305) Range of guaranteed surface hardness for nitriding (Details ☞ P.1308)
Range of guaranteed base material hardness (Details ☞ P.1307) ❢ No nitriding on the tip (ℓ).

Type	T D	Head Thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPN—5	$^{-0.01}_{-0.02}$ ❢ D 12 or L>500 ···› D$^{-0.01}_{-0.03}$	4mm (T4)	$^{0}_{-0.02}$ (L>300 ···› T$^{0}_{-0.05}$)	$^{+0.01}_{0}$ or H7 Details ☞ P.1309
CPNK—5				
CPJ—5		4・6・8mm(JIS)	$^{0}_{-0.05}$	
CPJK—5				

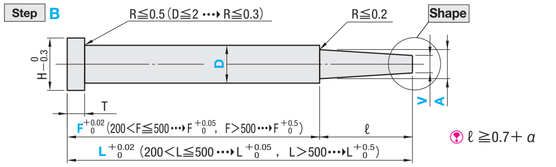
Step (Step type) Select from A～E in the drawings below

Step A


R≦0.5 (D≦2 ···› R≦0.3)
Shape
Select from the drawings on the right.
H$^{0}_{-0.3}$
D
V
T
F$^{+0.05}_{0}$ (F>500 ···› F$^{+0.5}_{0}$)
ℓ
L$^{+0.02}_{0}$ (200<L≦500···› L$^{+0.05}_{0}$, L>500 ···› L$^{+0.5}_{0}$)

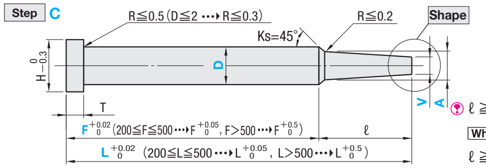
❢ ℓ ≧0.5+ α

Step B


R≦0.5 (D≦2 ···› R≦0.3)
R≦0.2
Shape
H$^{0}_{-0.3}$
D
V
A
T
F$^{+0.02}_{0}$ (200<F≦500···› F$^{+0.05}_{0}$, F>500···› F$^{+0.5}_{0}$)
ℓ
L$^{+0.02}_{0}$ (200<L≦500 ···› L$^{+0.05}_{0}$, L>500···› L$^{+0.5}_{0}$)

❢ ℓ ≧0.7+ α

Step C

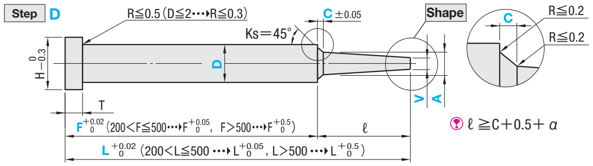

R≦0.5 (D≦2 ···› R≦0.3)
Ks=45°
R≦0.2
Shape
H$^{0}_{-0.3}$
D
V
A
T
F$^{+0.02}_{0}$ (200≦F≦500···› F$^{+0.05}_{0}$, F>500···› F$^{+0.5}_{0}$)
ℓ
L$^{+0.02}_{0}$ (200≦L≦500···› L$^{+0.05}_{0}$, L>500···› L$^{+0.5}_{0}$)

❢ $\ell \geqq \frac{D-A}{2}+0.5+\alpha$

When AC code is used

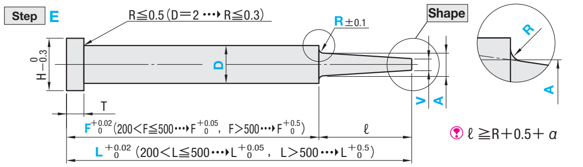
$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$

Step D


R≦0.5 (D≦2···›R≦0.3)
Ks=45°
C±0.05
Shape
R≦0.2
C
R≦0.2
H$^{0}_{-0.3}$
D
V
A
T
F$^{+0.02}_{0}$ (200<F≦500···›F$^{+0.05}_{0}$, F>500···›F$^{+0.5}_{0}$)
ℓ
L$^{+0.02}_{0}$ (200<L≦500 ···› L$^{+0.05}_{0}$, L>500 ···› L$^{+0.5}_{0}$)

❢ ℓ ≧C+0.5+ α

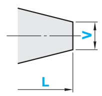
Step E


R≦0.5 (D=2 ···› R≦0.3)
R±0.1
Shape
R
A
H$^{0}_{-0.3}$
D
V
A
T
F$^{+0.02}_{0}$ (200<F≦500···› F$^{+0.05}_{0}$, F>500···› F$^{+0.5}_{0}$)
ℓ
L$^{+0.02}_{0}$ (200<L≦500···› L$^{+0.05}_{0}$, L>500···› L$^{+0.5}_{0}$)

❢ ℓ ≧R+0.5+ α

Shape (Tip shape : V is dimension before tip processing.)

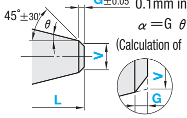
(Not processed)



❢ Designation of the shape is unnecessary when tip processing is not required.

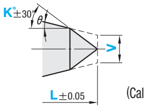
α =0

C (C chamfered)


45°±30'
θ
G±0.05
V
L
V
G

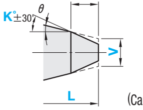
0.5≦G<V/2
0.1mm increments
α =G θ <45°
(Calculation of θ ☞ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha = \frac{V}{2\tan K}$ θ <K
(Calculation of θ ☞ P.1315)

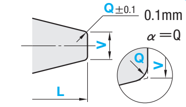
T (Tapered)


S±0.05
θ
K°±30'
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

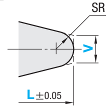
20<K≦45
1° increments
α =S θ <K
(Calculation of θ ☞ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α =Q

B (Spherical processed)



α =V/2

Group	Type		Step (Step type A・V・Ks) T							
			Step A	Step B	Step C		Step D		Step E	
	4mm head	JIS head	V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPN—5□	CPJ—5□	±0.02	±0.02	±0.02	±1°	±0.02	±1°	±0.02	±0.02
	CPNK—5□	CPJK—5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°		±0.01

❢ Non JIS material definition is listed on P.1351 - 1352

4mm head		JIS head		Part Number					L	0.01mm increments			0.1mm increments	ℓ
				Type		Step	Shape	D	0.01mm increments (L>500 ···› 0.1mm increments)					
H	T	H	T	4mm head	JIS head					F	A	Vmin.	C・R	max.
3	4	3	4	CPN—5 CPNK—5	CPJ—5 CPJK—5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1.5	70.00～200.00	F≧50.00	D>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{D-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{D-A}{2}$	20
4		4						2	70.00～400.00			0.70		25
5		5						2.5						30
6		6						3	70.00～400.00 (500.00)			1.00		35
7		7						3.5						40
		8	6					4	70.00～400.00 (700.00)					45
8								4.5				1.50		50
		9						5						
9								5.5	70.00～500.00			2.00		
		10						6	70.00～500.00 (700.00)					
10		11						6.5						
								7	70.00～500.00 (800.00)					
11		13	8					8						
14		14						9						
15		15						10						
17		17						12						
—	—	20		—				15						
		21						16				2.50		

❢ Step E is D≧2 ❢ L dimension designation in ( ) is only available for CPJ—5, CPJK—5. ❢ Refer to the drawing for ℓ min. (normally, α =0)

Order

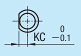
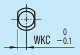
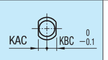
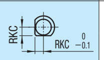
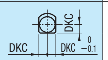
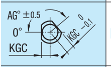
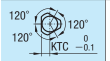
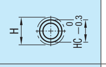
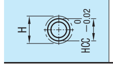
Part Number	L	F	A	V	C(R)	Tip size (K・S・G・Q)
CPJ—5ER 6	350.00	F330.00	A5.00	V4.00	R0.5	Q1.5

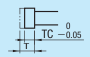
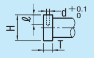
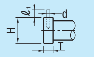
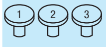
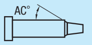
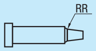
Days to Ship Quotation

Alterations

Part Number	L	F	A	V	C(R)	Tip size (K・S・G・Q)	(KC・WKC···etc.)
CPJ—5ER 6	350.00	F330.00	A5.00	V4.00	R0.5	Q1.5	KC3.0

Alteration details ☞ P.351

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments ❢ D≦HC<H ❢ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments ❢ D+1≦HCC<H−0.3		

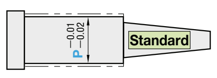
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments ❢ T/2≦TC<T ❢ T−TC≦Lmax.−L (Dimensions L and F remain unchanged.)	Quotation
	NC	Dowel hole boring ⊗ Combination with other than NHC・NHN・AC・RR not available. T 4, d 2, ℓ 3 T 6・8, d 3, ℓ 5	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN・AC・RR not available. T 4, d 2, ℓ1 5 T 6・8, d 3, ℓ1 5	
	NHC	Numbering on the head How to order ☞ P.352 ❢ Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order ☞ P.352 ❢ Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments ❢ 30≦AC≦60 ❢ Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR ❢ Available for Step B・C・D ❢ D−A≧1.0 When Step D, C≧0.5	

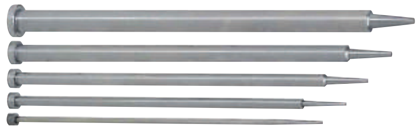
Price Quotation

Dies Steel
SKD61 equivalent+Nitrided
P $^{-0.01}_{-0.02}$

ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.1mm INCREMENTS) TIP (A・V) TOLERANCE ±0.01／±0.02 TYPE—


P $^{-0.01}_{-0.02}$
Standard



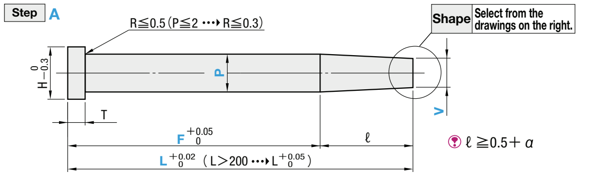
M SKD61 equivalent+Nitrided
H Surface 900HV～
Base material 40～45HRC

Range of guaranteed shaft diameter precision (Details ☞ P.1305) Range of guaranteed surface hardness for nitriding (Details ☞ P.1308)
Range of guaranteed base material hardness (Details ☞ P.1307) ⓘ No nitriding on the tip(ℓ).

Type	T P	Head Thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPNG—5	$^{-0.01}_{-0.02}$ ⓘ P 12 ···› P $^{-0.01}_{-0.03}$	4mm (T4)	$^{0}_{-0.02}$ (L>300 ···› T $^{0}_{-0.05}$)	$^{+0.01}_{0}$ or H7 Details ☞ P.1309
CPNKG—5				
CPJG—5		4・6・8mm(JIS)	$^{0}_{-0.05}$	
CPJKG—5				

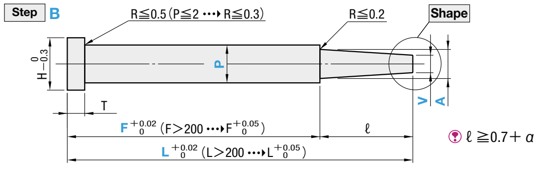
Step (Step type) Select from A～E in the drawings below

Step A


R≦0.5 (P≦2 ···› R≦0.3)
Shape Select from the drawings on the right.
H $^{0}_{-0.3}$
P
T
V
F $^{+0.05}_{0}$
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

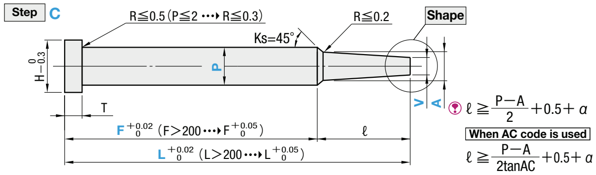
ⓘ ℓ ≧0.5+ α

Step B


R≦0.5 (P≦2 ···› R≦0.3)
R≦0.2
Shape
H $^{0}_{-0.3}$
P
T
V
A
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ⓘ ℓ ≧0.7+ α

Step C

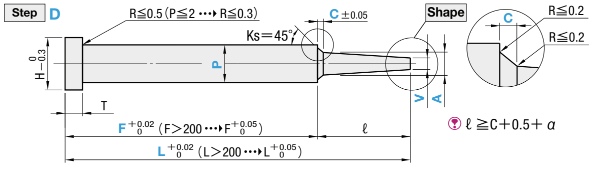

R≦0.5 (P≦2 ···› R≦0.3)
Ks=45°
R≦0.2
Shape
H $^{0}_{-0.3}$
P
T
V
A
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ⓘ $\ell \geqq \frac{P-A}{2} + 0.5 + \alpha$

When AC code is used

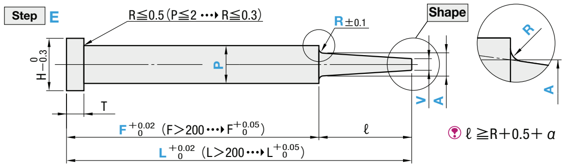
$\ell \geqq \frac{P-A}{2\tan AC} + 0.5 + \alpha$

Step D


R≦0.5 (P≦2 ···› R≦0.3)
C ±0.05
Ks=45°
Shape
C
R≦0.2
R≦0.2
H $^{0}_{-0.3}$
P
T
V
A
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ⓘ ℓ ≧C+0.5+ α

Step E

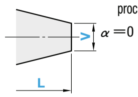

R≦0.5 (P≦2 ···› R≦0.3)
R ±0.1
Shape
R
H $^{0}_{-0.3}$
P
T
V
A
A
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ⓘ ℓ ≧R+0.5+ α

Shape (Tip shape : V is dimension before tip processing.)

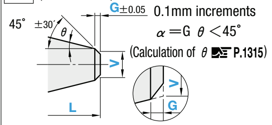
(Not processed)

ⓘ Designation of the shape is unnecessary when tip processing is not required.



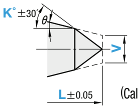
α =0

C (C chamfered)


45° ±30′
θ
G±0.05
V
L
V
G

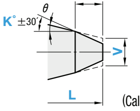
0.5≦G<V/2
0.1mm increments
α =G θ <45°
(Calculation of θ ☞ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha = \frac{V}{2\tan K}$ θ <K
(Calculation of θ ☞ P.1315)

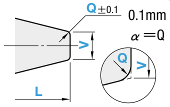
T (Tapered)


S±0.05
θ
K° ±30′
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

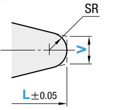
20<K≦45
1° increments
α =S θ <K
(Calculation of θ ☞ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α =Q

B (Spherical processed)



α =V/2

Group	Type: 4mm head	Type: JIS head	Step A: V	Step B: A・V	Step C: A・V	Step C: Ks	Step D: A・V	Step D: Ks	Step E: A	Step E: V
Standard	CPNG—5□	CPJG—5□	±0.02	±0.02	±0.02	±1°	±0.02	±1°	±0.02	±0.02
	CPNKG—5□	CPJKG—5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°		±0.01

Step (Step type A・V・Ks) T

ⓘ Non JIS material definition is listed on P.1351 - 1352

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	Shape	No.	L 0.01mm increments	P 0.1mm increments	0.01mm increments F	0.01mm increments A	Vmin.	0.1mm increments C・R	ℓ max.
4	4	4	4	CPNG—5 CPNKG—5	CPJG—5 CPJKG—5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	2	70.00～400.00	1.5～ 1.9	F≧50.00	P>A≧V No need to designate A when Step A is selected.	0.70	Step D only 0.1≦C≦1.5 and $C-\frac{P-A}{2}$ Step E only R≧0.3 and $R \leqq \frac{P-A}{2}$	25
5		5						2.5		2.0～ 2.4					30
6		6						3	70.00～400.00	2.5～ 2.9			1.00		35
7		7						3.5		3.0～ 3.4					40
		8	6					4		3.5～ 3.9					45
8								4.5		4.0～ 4.4			1.50		50
		9						5	70.00～500.00	4.5～ 4.9					
9								5.5		5.0～ 5.4			2.00		
		10						6		5.5～ 5.9					
10		11						6.5		6.0～ 6.4					
								7		6.5～ 6.9					
11		13	8					8		7.0～ 7.9					
15		15						10		8.0～ 9.9					
17		17						12		10.0～11.9					
—	—	20		—				15		12.0～14.9					
		21						16		15.0～15.9			2.50		

ⓘ Refer to the drawing for ℓ min. (normally, α =0) ⓘ Step E is P≧2.0

Order

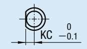
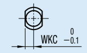
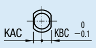
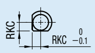
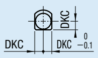
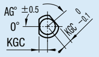
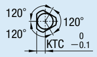
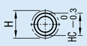
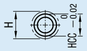
Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)
CPJG—5EG 6	—	350.00	—	P5.9	—	F330.00	—	A4.80	—	V4.00	—	R0.5	—	K30

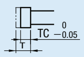
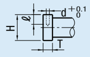
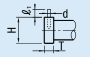
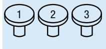
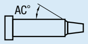
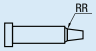
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPJG—5EG 6	—	350.00	—	P5.9	—	F330.00	—	A4.80	—	V4.00	—	R0.5	—	K30	—	KC3.0

Alteration details ☞ P.351

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting P/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	HC=0.1mm increments ⓘ P≦HC<H ⓘ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments ⓘ P+1≦HCC<H—0.3		

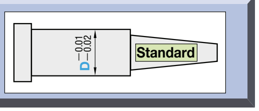
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments ⓘ T/2≦TC<T ⓘ T—TC≦Lmax.—L (Dimensions L and F remain unchanged.)	Quotation
	NC	Dowel hole boring ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN・AC・RR not available. T / d / ℓ1: 4 / 2 / 5; 6, 8 / 3 / 5	
	NHC	Numbering on the head How to order ☞ P.352 ⓘ Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order ☞ P.352 ⓘ Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments ⓘ 30≦AC≦60 ⓘ Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR ⓘ Available for Step B・C・D ⓘ P—A≧1.0 When Step D, C≧0.5	

Price Quotation

Dies Steel
SKD61 equivalent+Nitrided
$D^{-0.01}_{-0.02}$

ONE-STEP CENTER PINS WITH COOLING HOLE

—SHAFT DIAMETER (D) SELECTION TIP (A・V) TOLERANCE : ±0.02 TYPE—



$D^{-0.01}_{-0.02}$
Standard

Non JIS material definition is listed on P.1351 - 1352

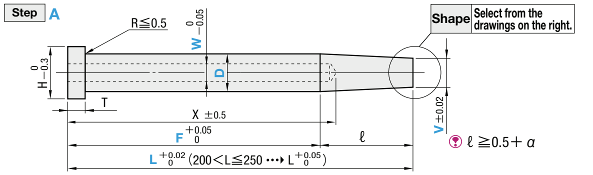
RoHS

M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40±3HRC

Range of guaranteed shaft diameter precision (Details P.1305) Range of guaranteed surface hardness for nitriding (Details P.1308)
Range of guaranteed base material hardness (Details P.1307) No nitriding on the tip(ℓ). No nitriding to the cooling hole.

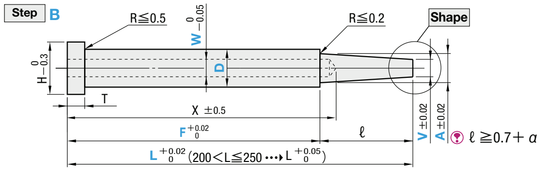
Type	T D	Head Thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
RDCPN−5	$^{-0.01}_{-0.02}$ D 12 $^{-0.01}_{-0.03}$	4mm (T4)	$^{0}_{-0.02}$	$^{+0.01}_{0}$ or H7 Details P.1309
RDCPJ−5		6・8mm(JIS)	$^{0}_{-0.05}$	

Step (Step type) Select from A～E in the drawings below



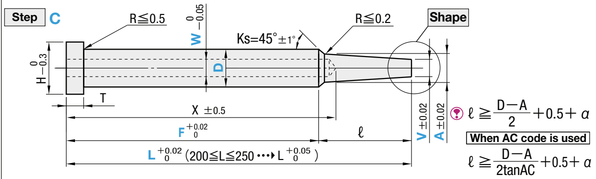
Step A
R≦0.5
W $^{0}_{-0.05}$
D
H $^{0}_{-0.3}$
T
X ±0.5
F $^{+0.05}_{0}$
ℓ
L $^{+0.02}_{0}$ (200<L≦250 ···▸ L $^{+0.05}_{0}$)
V ±0.02
Shape
Select from the drawings on the right.

ℓ≧0.5+α



Step B
R≦0.5
W $^{0}_{-0.05}$
R≦0.2
Shape
D
H $^{0}_{-0.3}$
T
X ±0.5
F $^{+0.02}_{0}$
ℓ
L $^{+0.02}_{0}$ (200<L≦250 ···▸ L $^{+0.05}_{0}$)
V ±0.02
A ±0.02

ℓ≧0.7+α

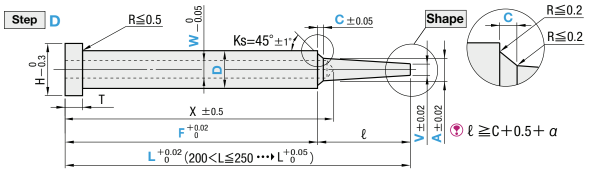


Step C
R≦0.5
W $^{0}_{-0.05}$
Ks=45°±1°
R≦0.2
Shape
D
H $^{0}_{-0.3}$
T
X ±0.5
F $^{+0.02}_{0}$
ℓ
L $^{+0.02}_{0}$ (200≦L≦250 ···▸ L $^{+0.05}_{0}$)
V ±0.02
A ±0.02

$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

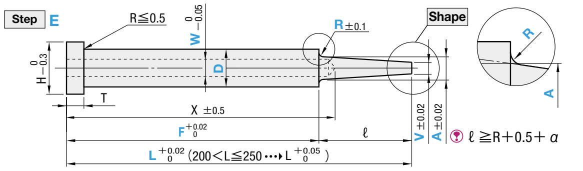
When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$



Step D
R≦0.5
W $^{0}_{-0.05}$
Ks=45°±1°
C ±0.05
Shape
C
R≦0.2
R≦0.2
D
H $^{0}_{-0.3}$
T
X ±0.5
F $^{+0.02}_{0}$
ℓ
L $^{+0.02}_{0}$ (200<L≦250 ···▸ L $^{+0.05}_{0}$)
V ±0.02
A ±0.02

ℓ≧C+0.5+α



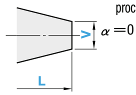
Step E
R≦0.5
W $^{0}_{-0.05}$
R ±0.1
Shape
R
A
D
H $^{0}_{-0.3}$
T
X ±0.5
F $^{+0.02}_{0}$
ℓ
L $^{+0.02}_{0}$ (200<L≦250 ···▸ L $^{+0.05}_{0}$)
V ±0.02
A ±0.02

ℓ≧R+0.5+α

Shape (Tip shape : V is dimension before tip processing.)

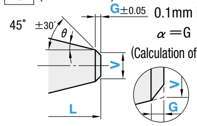
(Not processed)

Designation of the shape is unnecessary when tip processing is not required.



α=0

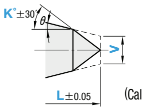
C (C chamfered)



45° ±30′
θ
G±0.05
V
L
G

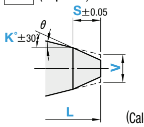
0.5≦G<V/2
0.1mm increments
α=G θ<45°
(Calculation of θ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K}$ θ<K
(Calculation of θ P.1315)

T (Tapered)

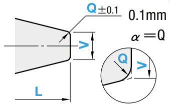


S±0.05
θ
K°±30′
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

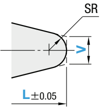
20<K≦45
1° increments
α=S θ<K
(Calculation of θ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	Shape	D	L 0.01mm increments	F (0.01mm increments)	A (0.01mm increments)	Vmin. (0.01mm increments)	C・R (0.1mm increments)	W (0.5mm increments)	ℓ max.	X
9	4	10	6	RDCPN−5	RDCPJ−5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	6	70.00～150.00	F≧50.00	D>A≧V No need to designate A when Step A is selected.	5.00	Step D only 0.1≦C≦1.5 and $C<\frac{D-A}{2}$ Step E only R≧0.3 and $R \leqq \frac{D-A}{2}$	3.0	50	*Refer to under
10		11						7				6.00		3.0		L−10
11		13	8					8	70.00～200.00			7.00		4.0		
15		15						10	70.00～250.00			8.00		5≦W≦V−3		
17		17						12				9.00				
—	—	20		—				15						6≦W≦V−3		
		21						16								

Refer to the drawing for ℓ min. (normally, α=0) X dimension of *D=6 : When ℓ≧10, X=F. ℓ<10, X=L−10.

Order

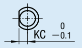
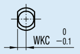
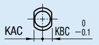
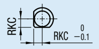
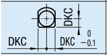
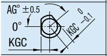
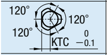
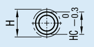
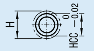
Part Number	L	F	A	V	C(R)	Tip size (K・S・G・Q)	W
RDCPN−5ER10	175.00	F150.00	A9.00	V8.50	R0.5	Q0.3	W5.5

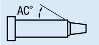
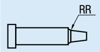
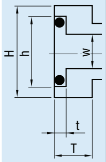
Days to Ship Quotation

Alterations

Part Number	L	F	A	V	C(R)	Tip size (K・S・G・Q)	W	(KC・WKC···etc.)
RDCPN−5ER10	175.00	F150.00	A9.00	V8.50	R0.5	Q0.3	W5.5	KC5.0

Alteration details P.351

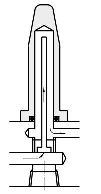
Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2 Key Flat Cutting Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	

Alterations	Code	Spec.	1Code
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B・C・D D−A≧1.0 When Step D, C≧0.5	
	ZPC	O-ring groove machining (ORP refer to P.1137) Designation method Code ZPC O-ring (ORP) 3 H−h≧2 T≧4 No.≧W ⊗ Combination with other than AC・RR not available.	Quotation

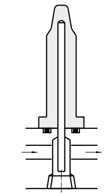
No.	h	t
3	6	1.4
4	7	
5	8	
6	9	
7	10	
8	11	
9	12	
10	13	
11	15	1.8
12	16	
14	18	

Price Quotation

Example



Cooling pipe



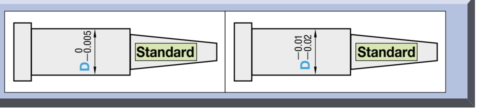
Heat exchange pipe

Please use cooling pipes or heat exchange pipes so as to increase cooling efficiency for the tip section of center pins.

Dies Steel
SKD61 equivalent
$D^{0}_{-0.005}$ ／ $^{-0.01}_{-0.02}$

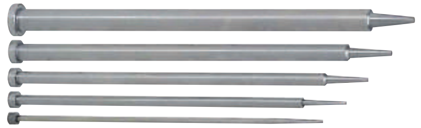
ONE-STEP CENTER PINS

—SHAFT DIAMETER (D) SELECTION TIP (A・V) TOLERANCE : ±0.01／±0.02 TYPE—



$D^{0}_{-0.005}$
Standard
$D^{-0.01}_{-0.02}$
Standard

Non JIS material definition is listed on P.1351 - 1352

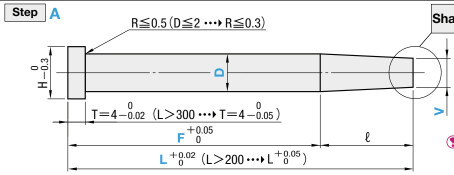


M SKD61 equivalent Range of guaranteed shaft diameter precision (Details P.1305)
H 50～55HRC Range of guaranteed base material hardness (Details P.1307)

Type	T D	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPP—5	$^{0}_{-0.005}$	4mm (T4)	$^{+0.005}_{0}$ Details P.1309
CPD—5	$^{-0.01}_{-0.02}$		$^{+0.01}_{0}$ or H7 Details P.1309
CPDK—5			

Step (Step type) Select from A～E in the drawings below

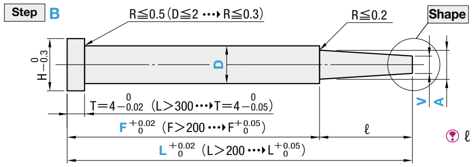
Step A



R≦0.5 (D≦2 ･･･▸ R≦0.3)
Shape
Select from the drawings on the right.
H—0.3 0
D
V
T=4—0.02 0 (L>300 ･･･▸ T=4—0.05 0)
F +0.05 0
ℓ
L +0.02 0 (L>200 ･･･▸ L +0.05 0)

$\ell \geqq 0.5+\alpha$

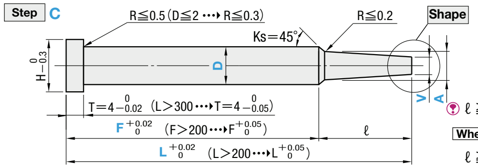
Step B



R≦0.5 (D≦2 ･･･▸ R≦0.3)
R≦0.2
Shape
H—0.3 0
D
V
A
T=4—0.02 0 (L>300 ･･･▸ T=4—0.05 0)
F +0.02 0 (F>200 ･･･▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ･･･▸ L +0.05 0)

$\ell \geqq 0.7+\alpha$

Step C



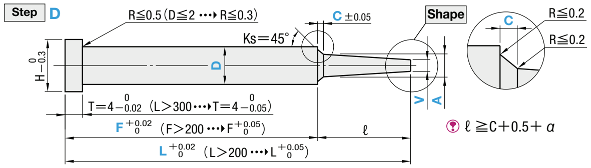
R≦0.5 (D≦2 ･･･▸ R≦0.3)
R≦0.2
Ks=45°
Shape
H—0.3 0
D
V
A
T=4—0.02 0 (L>300 ･･･▸ T=4—0.05 0)
F +0.02 0 (F>200 ･･･▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ･･･▸ L +0.05 0)

$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$

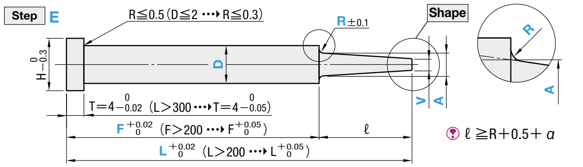
Step D



R≦0.5 (D≦2 ･･･▸ R≦0.3)
C ±0.05
Ks=45°
Shape
C
R≦0.2
R≦0.2
H—0.3 0
D
V
A
T=4—0.02 0 (L>300 ･･･▸ T=4—0.05 0)
F +0.02 0 (F>200 ･･･▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ･･･▸ L +0.05 0)

$\ell \geqq C+0.5+\alpha$

Step E



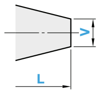
R≦0.5 (D≦2 ･･･▸ R≦0.3)
R±0.1
Shape
R
H—0.3 0
D
V
A
T=4—0.02 0 (L>300 ･･･▸ T=4—0.05 0)
F +0.02 0 (F>200 ･･･▸ F +0.05 0)
ℓ
L +0.02 0 (L>200 ･･･▸ L +0.05 0)

$\ell \geqq R+0.5+\alpha$

Shape (Tip shape : V is dimension before tip processing.)

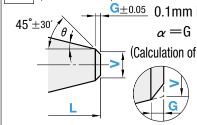
(Not processed)

Designation of the shape is unnecessary when tip processing is not required.



$\alpha=0$

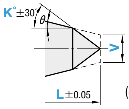
C (C chamfered)



45°±30′
θ
G±0.05
V
L
V
G

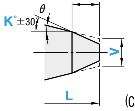
0.5≦G<V/2
0.1mm increments
$\alpha=G \quad \theta<45°$
(Calculation of θ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K} \quad \theta<K$
(Calculation of θ P.1315)

T (Tapered)

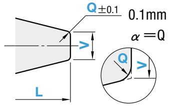


S±0.05
θ
K°±30′
V
L

$0.1\leqq S<\frac{V}{2\tan K}$
0.1mm increments

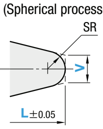
20<K≦45
1° increments
$\alpha=S \quad \theta<K$
(Calculation of θ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
$\alpha=Q$

B (Spherical processed)



$\alpha=V/2$

Group	Type 4mm head	Step (Step type A・V・Ks) T							
		Step A	Step B	Step C		Step D		Step E	
		V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPP—5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°	±0.02	±0.01
	CPD—5□	±0.02	±0.02	±0.02	±1°	±0.02	±1°	±0.02	±0.02
	CPDK—5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°		±0.01

H	Part Number				0.01mm increments				0.1mm increments	ℓ max.
	Type	Step	Shape	D	L	F	A	Vmin.	C・R	
3	CPP—5 CPD—5 CPDK—5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1.5	70.00～200.00	F≧50.00	D>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{D-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{D-A}{2}$	20
4				2	70.00～250.00			0.70		25
5				2.5						30
6				3	70.00～300.00			1.00		35
7				3.5						40
				4						45
8				4.5				1.50		50
				5	70.00～500.00					
9				5.5				2.00		
				6						
10				6.5						
				7						
11				8						
15				10						
17				12						

Refer to the drawing for ℓ min. (normally, α=0)

Order

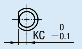
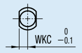
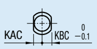
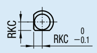
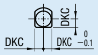
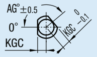
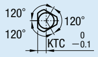
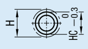
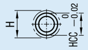
Part Number	—	L	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)
CPP—5EB6	—	350.00	—	F330.00	—	A5.00	—	V4.50	—	R0.5		

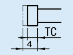
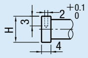
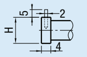
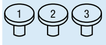
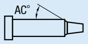
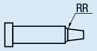
Days to Ship Quotation

Alterations

Part Number	—	L	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPP—5EB6	—	350.00	—	F330.00	—	A5.00	—	V4.00	—	R0.5			—	KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments D+1≦HCC<H—0.3		

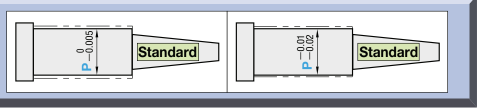
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 4—TC≦Lmax.—L (Dimensions L and F remain unchanged.)	Quotation
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available.	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available.	
	NHC	Numbering on the head How to order **P.352** Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order **P.352** Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C・D ⊗ Combination with RR not available When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for strength improvement) Designation method RR Available for Step B・C・D D—A≧1.0 When Step D, C≧0.5	

Price Quotation

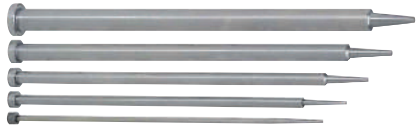
Dies Steel
SKD61 equivalent
$P^{\ 0}_{-0.005}$ ／ $^{-0.01}_{-0.02}$

ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A・V) TOLERANCE : ±0.01／±0.02 TYPE—


P $^{\ 0}_{-0.005}$
Standard
P $^{-0.01}_{-0.02}$
Standard

Non JIS material definition is listed on P.1351 - 1352

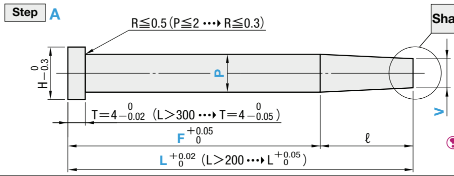


M SKD61 equivalent Range of guaranteed shaft diameter precision (Details P.1305)
H 50~55HRC Range of guaranteed base material hardness (Details P.1307)

Type	T P	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPPG−5	$^{\ 0}_{-0.005}$	4mm (T4)	$^{+0.005}_{\ 0}$ Details P.1309
CPDG−5	$^{-0.01}_{-0.02}$		$^{+0.01}_{\ 0}$ or H7 Details P.1309
CPDKG−5			

Step (Step type) Select from A~E in the drawings below

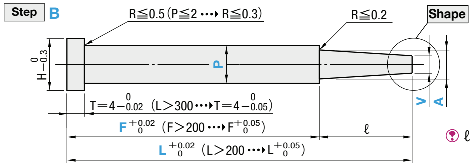
Step A


R≦0.5 (P≦2 ⋯▸ R≦0.3)
H $^{\ 0}_{-0.3}$
P
V
T=4 $^{\ 0}_{-0.02}$ (L>300 ⋯▸ T=4 $^{\ 0}_{-0.05}$)
F $^{+0.05}_{\ 0}$
ℓ
L $^{+0.02}_{\ 0}$ (L>200 ⋯▸ L $^{+0.05}_{\ 0}$)

Shape Select from the drawings on the right.

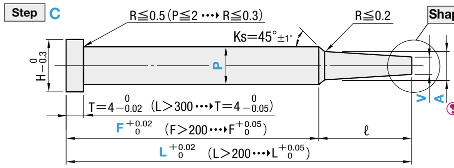
ℓ≧0.5+α

Step B


R≦0.5 (P≦2 ⋯▸ R≦0.3)
R≦0.2
Shape
H $^{\ 0}_{-0.3}$
P
V
A
T=4 $^{\ 0}_{-0.02}$ (L>300 ⋯▸ T=4 $^{\ 0}_{-0.05}$)
F $^{+0.02}_{\ 0}$ (F>200 ⋯▸ F $^{+0.05}_{\ 0}$)
ℓ
L $^{+0.02}_{\ 0}$ (L>200 ⋯▸ L $^{+0.05}_{\ 0}$)

ℓ≧0.7+α

Step C

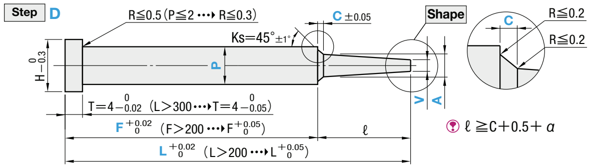

R≦0.5 (P≦2 ⋯▸ R≦0.3)
R≦0.2
Shape
Ks=45°±1°
H $^{\ 0}_{-0.3}$
P
V
A
T=4 $^{\ 0}_{-0.02}$ (L>300 ⋯▸ T=4 $^{\ 0}_{-0.05}$)
F $^{+0.02}_{\ 0}$ (F>200 ⋯▸ F $^{+0.05}_{\ 0}$)
ℓ
L $^{+0.02}_{\ 0}$ (L>200 ⋯▸ L $^{+0.05}_{\ 0}$)

$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

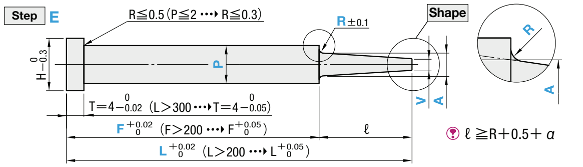
$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

Step D


R≦0.5 (P≦2 ⋯▸ R≦0.3)
C ±0.05
Shape
R≦0.2
R≦0.2
C
Ks=45°±1°
H $^{\ 0}_{-0.3}$
P
V
A
T=4 $^{\ 0}_{-0.02}$ (L>300 ⋯▸ T=4 $^{\ 0}_{-0.05}$)
F $^{+0.02}_{\ 0}$ (F>200 ⋯▸ F $^{+0.05}_{\ 0}$)
ℓ
L $^{+0.02}_{\ 0}$ (L>200 ⋯▸ L $^{+0.05}_{\ 0}$)

ℓ≧C+0.5+α

Step E

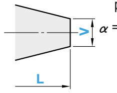

R≦0.5 (P≦2 ⋯▸ R≦0.3)
R ±0.1
Shape
R
A
H $^{\ 0}_{-0.3}$
P
V
A
T=4 $^{\ 0}_{-0.02}$ (L>300 ⋯▸ T=4 $^{\ 0}_{-0.05}$)
F $^{+0.02}_{\ 0}$ (F>200 ⋯▸ F $^{+0.05}_{\ 0}$)
ℓ
L $^{+0.02}_{\ 0}$ (L>200 ⋯▸ L $^{+0.05}_{\ 0}$)

ℓ≧R+0.5+α

Shape (Tip shape : V is dimension before tip processing.)

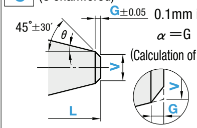
(Not processed)

Designation of the shape is unnecessary when tip processing is not required.



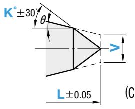
α=0

C (C chamfered)


G±0.05
45°±30′
θ
V
L
V
G

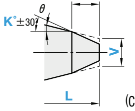
0.5≦G<V/2
0.1mm increments
α=G θ<45°
(Calculation of θ P.1315)

G (Cone)



20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K}$ θ<K
(Calculation of θ P.1315)

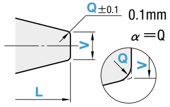
T (Tapered)


S±0.05
θ
K°±30′
V
L

$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments

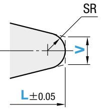
20<K≦45
1° increments
α=S θ<K
(Calculation of θ P.1315)

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

Group	Type 4mm head	Step (Step type A・V・Ks) T Step A	 Step B	 Step C		 Step D		 Step E	
		V	A・V	A・V	Ks	A・V	Ks	A	V
Standard	CPPG−5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°	±0.02	±0.01
	CPDG−5□	±0.02	±0.02	±0.02	±1°	±0.02	±1°	±0.02	±0.02
	CPDKG−5□	±0.01	±0.01	±0.01	±1°	±0.01	±1°		±0.01

H	Part Number Type	 Step	 Shape	 No.	0.01mm increments L	 P	 F	 A	 Vmin.	0.1mm increments C・R	ℓ max.
3	CPPG−5 CPDG−5 CPDKG−5	A B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1.5	70.00~200.00	1.00~ 1.49	F≧50.00	P>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{P-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{P-A}{2}$	20
4				2	70.00~250.00	1.50~ 1.99			0.70		25
5				2.5		2.00~ 2.49					30
6				3	70.00~300.00	2.50~ 2.99			1.00		35
7				3.5		3.00~ 3.49					40
				4		3.50~ 3.99					45
8				4.5		4.00~ 4.49			1.50		50
				5	70.00~350.00	4.50~ 4.99					
9				5.5		5.00~ 5.49			2.00		
				6		5.00~ 5.99					
10				6.5		5.00~ 6.49					
				7		6.00~ 6.99					
11				8		6.00~ 7.99					
15				10		8.00~ 9.99					
17				12		10.00~11.99					

Refer to the drawing for ℓ min. (normally, α=0) When P $^{-0.01}_{-0.02}$, Step E is No.1.5 (P≧1.10)~

Order

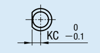
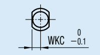
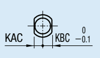
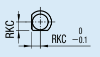
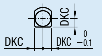
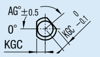
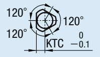
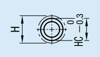
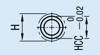
Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)
CPPG−5ER6	—	350.00	—	P5.95	—	F330.00	—	A4.95	—	V4.50	—	R0.5	—	Q1.5

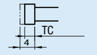
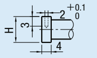
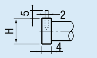
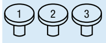
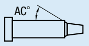
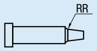
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC⋯etc.)
CPPG−5ER6	—	350.00	—	P5.95	—	F330.00	—	A4.95	—	V4.50	—	R0.5	—	Q1.5	—	KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
 DKC DKC DKC $^{\ 0}_{-0.1}$	DKC	Three flats cutting P/2≦DKC<H/2		
 AG°±0.5 0° KGC KGC $^{\ 0}_{-0.1}$	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{\ 0}_{-0.1}$	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	HC=0.1mm increments P≦HC<H When P, $^{-0.01}_{-0.02}$ P≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5		

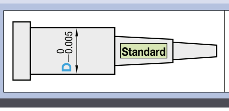
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 4−TC≦Lmax.−L, P≧1.5 (Dimensions L and F remain unchanged.)	Quotation
	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available.	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・AC・RR not available.	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C・D ⊗ Combination with RR not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	RR	Changes R (normally 0.2 or less) to R0.3~0.5. (for strength improvement) Designation method RR Available for Step B・C・D P−A≧1.0 When Step D, C≧0.5	

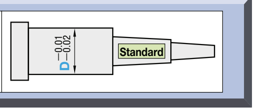
Price Quotation

High Speed Steel
SKH51 equivalent

TWO-STEP CENTER PINS

—SHAFT DIAMETER (D) SELECTION TIP (A・V・J・E) TOLERANCE : ±0.01 TYPE—


D 0/−0.005
Standard


D −0.01/−0.02
Standard

Ⓘ Non JIS material definition is listed on P.1351 - 1352

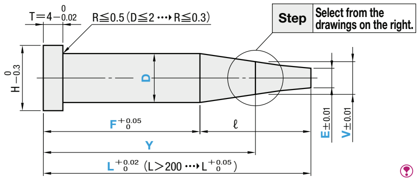
RoHS

M SKH51 equivalent　Range of guaranteed shaft diameter precision (Details ☞ **P.1305**)
H 58～60HRC　Range of guaranteed base material hardness Details ☞ **P.1307**)

Type	**T** D	Head Thickness (T)	Applicable ejector sleeve hole tolerance
C□H5	0 −0.005	4mm (T4)	+0.005 0 Details ☞ **P.1309**
C□HE5	−0.01 −0.02		+0.01 0 or H7 Details ☞ **P.1309**

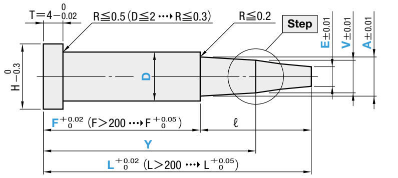
Type　Step shape (in ○) is selected from the drawings on the right.

CAH5
CAHE5


T=4 0/−0.02
R≦0.5 (D≦2 ···→ R≦0.3)
Step
Select from the drawings on the right.
H 0/−0.3
D
F +0.05/0
ℓ
Y
L +0.02/0 (L>200 ···→ L +0.05/0)
E±0.01
V±0.01

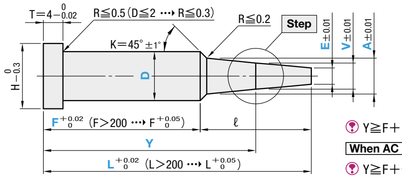
Ⓘ Y≧F+0.5

CBH5
CBHE5


T=4 0/−0.02
R≦0.5 (D≦2 ···→ R≦0.3)
R≦0.2
Step
H 0/−0.3
D
F +0.02/0 (F>200 ···→ F +0.05/0)
ℓ
Y
L +0.02/0 (L>200 ···→ L +0.05/0)
E±0.01
V±0.01
A±0.01

Ⓘ Y≧F+0.7

CCH5
CCHE5

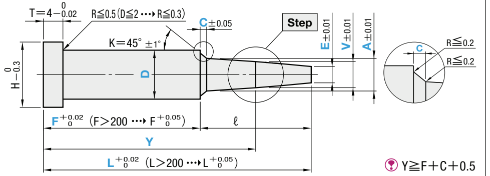

T=4 0/−0.02
R≦0.5 (D≦2 ···→ R≦0.3)
K=45°±1°
R≦0.2
Step
H 0/−0.3
D
F +0.02/0 (F>200 ···→ F +0.05/0)
ℓ
Y
L +0.02/0 (L>200 ···→ L +0.05/0)
E±0.01
V±0.01
A±0.01

Ⓘ $Y \geqq F+\frac{D-A}{2}+0.5$

When AC code is used

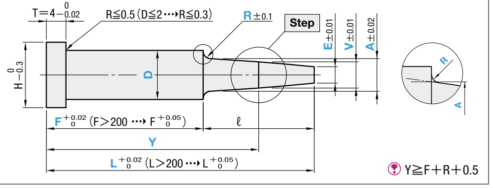
Ⓘ $Y \geqq F+\frac{D-A}{2\tan AC}+0.5$

CDH5
CDHE5


T=4 0/−0.02
R≦0.5 (D≦2 ···→ R≦0.3)
C±0.05
K=45°±1°
Step
H 0/−0.3
D
F +0.02/0 (F>200 ···→ F +0.05/0)
ℓ
Y
L +0.02/0 (L>200 ···→ L +0.05/0)
E±0.01
V±0.01
A±0.01
C
R≦0.2
R≦0.2

Ⓘ Y≧F+C+0.5

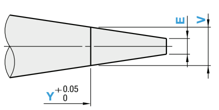
CEH5
CEHE5


T=4 0/−0.02
R≦0.5 (D≦2 ···→ R≦0.3)
R±0.1
Step
H 0/−0.3
D
F +0.02/0 (F>200 ···→ F +0.05/0)
ℓ
Y
L +0.02/0 (L>200 ···→ L +0.05/0)
E±0.01
V±0.01
A±0.02
R
A

Ⓘ Y≧F+R+0.5

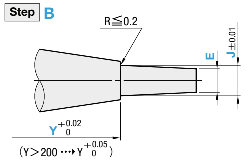
Step

Step A　(Designation of V=E possible)



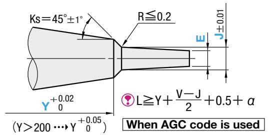
Ⓘ L≧Y+0.5+ α

Step B


R≦0.2
E
J±0.01
Y +0.02/0
(Y>200 ···→ Y +0.05/0)

Ⓘ L≧Y+0.7+ α

Step C

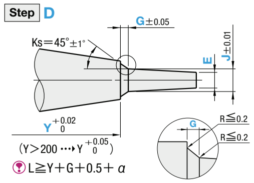

Ks=45°±1°
R≦0.2
E
J±0.01
Y +0.02/0
(Y>200 ···→ Y +0.05/0)

Ⓘ $L \geqq Y+\frac{V-J}{2}+0.5+\alpha$

When AGC code is used

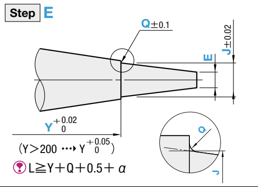
Ⓘ $L \geqq Y+\frac{V-J}{2\tan AGC}+0.5+\alpha$

Step D


G±0.05
Ks=45°±1°
E
J±0.01
Y +0.02/0
(Y>200 ···→ Y +0.05/0)
G
R≦0.2
R≦0.2

Ⓘ L≧Y+G+0.5+ α

Step E


Q±0.1
E
J±0.02
Y +0.02/0
(Y>200 ···→ Y +0.05/0)
Q
J

Ⓘ L≧Y+Q+0.5+ α

Order

Part Number	—	L	—	F	—	Y	—	A	—	V	—	J	—	E	—	C・G・R・Q
CCH5B 5	—	100.00	—	F50.00	—	Y52.00	—	A4.50	—	V4.20	—	J3.80	—	E2.80		

Days to Ship　Quotation

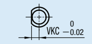
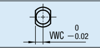
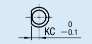
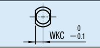
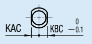
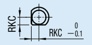
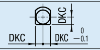
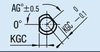
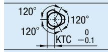
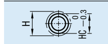
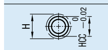
H	Part Number Type	Step	D	0.01mm increments L	F	Y	A	V	J	Emin.	0.1mm increments C・R	G・Q	ℓ max.
3	CAH5 CBH5 CCH5 CDH5 CEH5 CAHE5 CBHE5 CCHE5 CDHE5 CEHE5	A B C D E	1	70.00～200.00	F≧50.00	Refer to the working limits shown in the drawing Default α=0 When CX code is used α=CX When RX code is used α=RX When SR code is used $\alpha=\frac{E}{2}$	D>A and A≧V No need to designate A when Type CAH5 CAHE5 is selected.	A≧V and V>J Designation of V=E possible when Step A is selected.	V>J and J≧E No need to designate J when Step A is selected.	0.50	For Type CDH5 CDHE5 0.1≦C≦1.5 and $C-\frac{D-A}{2}$ For Type CEH5 CEHE5 R≧0.3 and $R\leqq\frac{D-A}{2}$	Step D only 0.1≦G≦0.5 and $G<\frac{V-J}{2}$ Step E only Q≧0.3 and $Q\leqq\frac{V-J}{2}$	15
			1.5	70.00 ～ 250.00									20
4			2							0.70			25
5			2.5										30
6			3	70.00 ～ 300.00									35
7			3.5							1.00			40
			4										45
8			4.5										50
			5	70.00 ～ 350.00						1.50			
9			5.5										
			6							2.00			
10			6.5										
			7										
11			8										
14			9										
15			10										
17			12							2.50			

Ⓘ D≧1.5 for Type CEH5・CEHE5

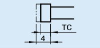
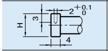
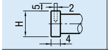
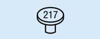
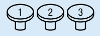
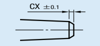
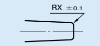
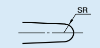
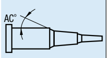
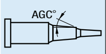
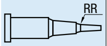
Alterations

Part Number	—	L	—	F	—	Y	—	A	—	V	—	J	—	E	—	C・G・R・Q	—	(KC・WKC···etc.)
CCH5B 5	—	100.00	—	F50.00	—	Y52.00	—	A4.50	—	V4.20	—	J3.80	—	E2.80			—	WKC2.5

Alteration details ☞ P.351

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments Ⓘ D≦HC<H, D≧1.5 Ⓘ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments Ⓘ D+1≦HCC<H−0.3, D≧1.5		

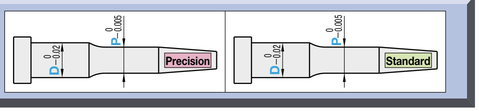
Price　Quotation

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments Ⓘ 2.0≦TC<4, D≧1.5 Ⓘ 4−TC≦Lmax.−L (Dimensions L, Y, and F remain unchanged)	Quotation
	NC	Dowel hole boring Ⓘ Available when H≧4 ⊗ Combination with other than CX・RX・SR・AC・AGC・NHC・NHN・RR not available.	
	NCW	Dowel hole boring+Spring pin driving Ⓘ Available when H≧4 ⊗ Combination with other than CX・RX・SR・AC・AGC・NHC・NHN・RR not available.	
	NHC	Numbering on the head How to order ☞ **P.352** Ⓘ Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order ☞ **P.352** Ⓘ Available when H≧2	
	CX	CX=0.1mm increments Ⓘ 0.3≦CX≦0.5, CX<E/2　Ⓘ Available when D≧2 E is a dimension prior to CX machining. ※ α=CX	
	RX	RX=0.1mm increments Ⓘ D≦4.5　0.3≦RX≦0.5,　RX<E/2 D>4.5　0.3≦RX≦1.0　Ⓘ Available when D≧2 E is a dimension prior to RX machining. ※ α=RX	
	SR	Finishes the tip in spherical shape (SR). Ⓘ Available when D≧2 Ⓘ L is $^{+0.05}_{0}$ ※ α=E/2 E is a dimension prior to SR machining.	
	AC	Changes the standard angle (K=45°). AC=1° increments Ⓘ 30≦AC≦60 Available for Type CCH5・CCHE5・CDH5・CDHE5 Ⓘ When CDH5・CDHE5, C≦1.0, A+2(CXtanAC°)<D	
	AGC	Changes the standard angle (Ks=45°). AGC=1° increments Ⓘ 30≦AGC≦60 Available for Step C・D　⊗ Combination with RR not available. Ⓘ When Step D, J+2(GXtanACG°)<V	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for Strength improvement)　Designation method RR Ⓘ Available for Step B・C・D Ⓘ D−A≧1.0　When Step D, C≧0.5	

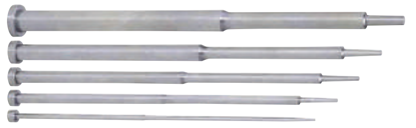
High Speed Steel
SKH51 equivalent

PRECISION STEPPED ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A・V) TOLERANCE±0.005／±0.01 TYPE—


D 0 −0.02
P 0 −0.005
Precision
D 0 −0.02
P 0 −0.005
Standard

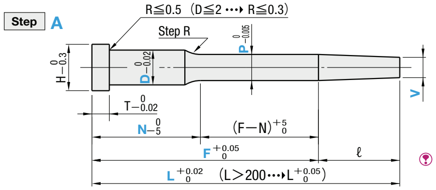
Non JIS material definition is listed on P.1351 - 1352



M SKH51 equivalent　Range of guaranteed shaft diameter precision (D) (Details P.1305)
H 58～60HRC　Range of guaranteed base material hardness (Details P.1307)

Type	T P	Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPHB—5	0 −0.005	4mm (T4)	+0.005 0 Details P.1309
CPVB—5			
CPHBJ—5		4・6・8mm (JIS)	
CPVBJ—5			

Step A

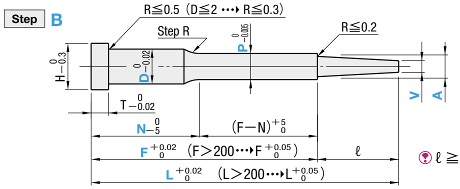

R≦0.5 (D≦2 ⋯▸ R≦0.3)
Step R
P 0 −0.005
H 0 −0.3
D 0 −0.02
V
T 0 −0.02
N 0 −5
(F−N) +5 0
F +0.05 0
ℓ
L +0.02 0 (L>200⋯▸L +0.05 0)

ℓ≧0.5+ α

Default α=0
When CX, RX or SR code is used
Alteration reference

Type	T P	T V
CPHB—5A	0 −0.005	±0.01
CPHBJ—5A		
CPVB—5A		±0.005
CPVBJ—5A		

Step B

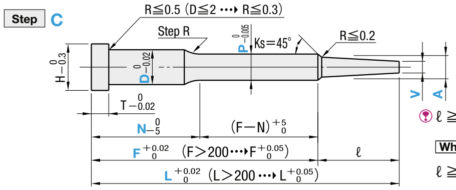

R≦0.5 (D≦2 ⋯▸ R≦0.3)
Step R
P 0 −0.005
R≦0.2
H 0 −0.3
D 0 −0.02
V
A
T 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200⋯▸F +0.05 0)
ℓ
L +0.02 0 (L>200⋯▸L +0.05 0)

ℓ≧0.7+ α

Default α=0
When CX, RX or SR code is used
Alteration reference

Type	T P	T A・V
CPHB—5B	0 −0.005	±0.01
CPHBJ—5B		
CPVB—5B		±0.005
CPVBJ—5B		

Step C


R≦0.5 (D≦2 ⋯▸ R≦0.3)
Step R
P 0 −0.005
Ks=45°
R≦0.2
H 0 −0.3
D 0 −0.02
V
A
T 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200⋯▸F +0.05 0)
ℓ
L +0.02 0 (L>200⋯▸L +0.05 0)

$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

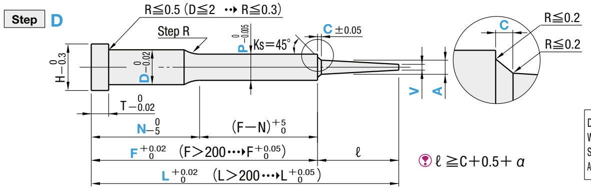
When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

Default α=0
When CX, RX or SR code is used
Alteration reference

Type	T P	T A・V	T Ks
CPHB—5C	0 −0.005	±0.01	±1°
CPHBJ—5C			
CPVB—5C		±0.005	±30°
CPVBJ—5C			

Step D

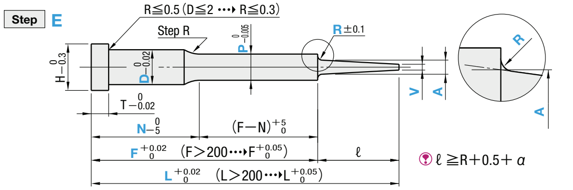

R≦0.5 (D≦2 ⋯▸ R≦0.3)
Step R
P 0 −0.005
Ks=45°
C ±0.05
C
R≦0.2
R≦0.2
H 0 −0.3
D 0 −0.02
V
A
T 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200⋯▸F +0.05 0)
ℓ
L +0.02 0 (L>200⋯▸L +0.05 0)

ℓ≧C+0.5+ α

Default α=0
When CX, RX or SR code is used
Alteration reference

Type	T P	T A・V	T Ks
CPHB—5D	0 −0.005	±0.01	±1°
CPHBJ—5D			
CPVB—5D		±0.005	±30°
CPVBJ—5D			

Step E


R≦0.5 (D≦2 ⋯▸ R≦0.3)
Step R
P 0 −0.005
R ±0.1
R
H 0 −0.3
D 0 −0.02
V
A
A
T 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200⋯▸F +0.05 0)
ℓ
L +0.02 0 (L>200⋯▸L +0.05 0)

ℓ≧R+0.5+ α

Default α=0
When CX, RX or SR code is used
Alteration reference

Type	T P	T A	T V
CPHB—5E	0 −0.005	±0.02	±0.01
CPHBJ—5E			
CPVB—5E			±0.005
CPVBJ—5E			

Order

Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)
CPHB—5E 6	—	350.00	—	P5.55	—	F330.00	—	A5.00	—	V4.50	—	R0.5

Days to Ship Quotation

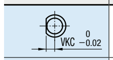
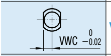
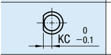
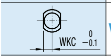
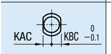
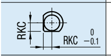
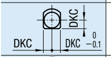
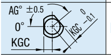
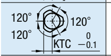
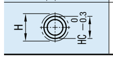
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	D	0.01mm increments L	P	F	A	Vmin.	0.1mm increments C・R	N	ℓ max.
3	4	3	4	CPHB—5 CPVB—5	CPHBJ—5 CPVBJ—5	A B C D E	1	70.00～150.00	0.80～0.89	F≧55.00	P>A≧V No need to designate A when Step A is selected.	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{P-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{P-A}{2}$	N≧25.0 and 30≦(F−N)≦200	15
								70.00～200.00	0.90～0.99						
							1.5	70.00～250.00	1.00～1.49						20
4		4					2		1.50～1.99			0.70			25
5		5					2.5		1.50～2.49						30
6		6					3	70.00～300.00	2.00～2.99			1.00			35
7		7					3.5		2.50～3.49						40
		8	6				4		3.00～3.99						45
8							4.5		3.50～4.49			1.50			50
		9					5	70.00～350.00	4.00～4.99						
9							5.5		5.00～5.49			2.00			
		10					6		5.00～5.99						
10		11					6.5		5.00～6.49						
							7		6.00～6.99						
11		13	8				8		6.00～7.99						
14		14					9		8.00～8.99						
15		15					10		8.00～9.99						
17		17					12		10.00～11.99						

Step E is D≧1.5(P≧1.10)～　Refer to the drawing for ℓ min. (normally, α=0)

Alterations

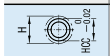
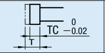
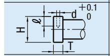
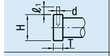
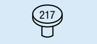
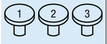
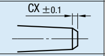
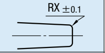
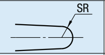
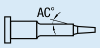
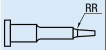
Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	(KC・WKC⋯etc.)
CPHB—5E 6	—	350.00	—	P5.55	—	F330.00	—	A5.00	—	V4.50	—	R0.5	—	KC3.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Two flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments D≦HC<H, D≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		

VKC 0 −0.02
VWC 0 −0.02
KC 0 −0.1
WKC 0 −0.1
KAC
KBC 0 −0.1
RKC
RKC 0 −0.1
DKC
DKC
DKC 0 −0.1
AG° ±0.5
0°
KGC
KGC 0 −0.1
120°
120°
120°
KTC 0 −0.1
H
HC 0 −0.3

Price Quotation

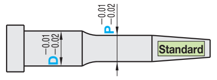
Alterations	Code	Spec.	1Code
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	Quotation
	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T−TC≦Lmax.−L (Dimensions L, F and N remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・CX・RX・SR・AC・RR not available. T d ℓ 4 2 3 6 3 5 8	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・CX・RX・SR・AC・RR not available. T d ℓ1 4 2 5 6 3 8	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<V/2 Available when P≧2 V is a dimension prior to CX machining. ※ α=CX	
	RX	RX=0.1mm increments P≦4.5　0.3≦RX≦0.5, RX<V/2 P>4.5　0.3≦RX≦1.0　Available when P≧2 V is a dimension prior to RX machining. ※ α=RX	
	SR	Finishes the tip in spherical shape (SR). Available when P≧2 L is $^{+0.05}_{0}$ ※ α=V/2 V is a dimension prior to SR machining.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments　30≦AC≦60 Available for Step C・D　Combination with RR not available. When Step D, C≦1.0 A+2(C×tanAC°)<P.	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for Strength improvement)　Designation method RR Available for Step B・C・D P−A≧1.0 When Step D, C≧0.5	

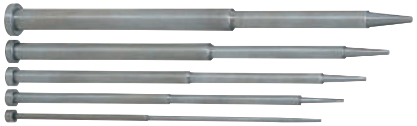
H
HCC 0 −0.02
TC 0 −0.02
T
H
ℓ
d +0.1 0
T
H
ℓ1
d
T
217
1
2
3
CX ±0.1
RX ±0.1
SR
AC°
RR

Dies Steel
SKD61 equivalent
+
Nitrided

STEPPED ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A • V) TOLERANCE : ±0.02 TYPE—


D −0.01 −0.02
P −0.01 −0.02
Standard

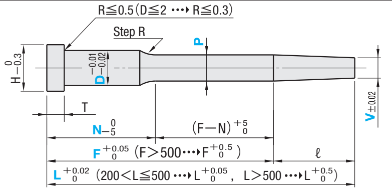


M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40~45HRC
No nitriding on the tip (ℓ).
Nitriding may extend to the head as it is applied after dimension P machining.

Range of guaranteed shaft diameter precision (D) (Details P.1305)
Range of guaranteed base material hardness (Details P.1307)
Range of guaranteed surface hardness for nitriding (Details P.1308)

Type	T P	Head Thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPNB−5	−0.01 −0.02	4mm (T4)	0 −0.02 (L>300 ···› T $^{0}_{-0.05}$)	+0.01 0 or H7 Details P.1309
CPJB−5	P 12 or L>500 ···› P $^{-0.01}_{-0.03}$	4 • 6 • 8mm (JIS)	0 −0.05	

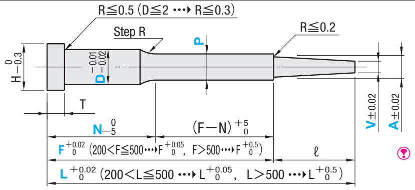
Step A


R≦0.5(D≦2 ···› R≦0.3)
Step R
P
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
T
N $^{0}_{-5}$
(F−N) $^{+5}_{0}$
F $^{+0.05}_{0}$ (F>500···›F $^{+0.5}_{0}$)
ℓ
L $^{+0.02}_{0}$ (200<L≦500 ···› L $^{+0.05}_{0}$, L>500 ···› L $^{+0.5}_{0}$)
V±0.02

ℓ ≧0.5+α

Default
α =0
※ When CX code is used
α =CX
※ When RX code is used
α =RX
※ When SR code is used
α =$\frac{V}{2}$

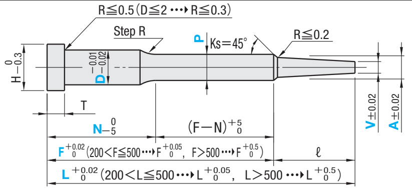
Step B


R≦0.5 (D≦2 ···› R≦0.3)
Step R
P
R≦0.2
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
T
N $^{0}_{-5}$
(F−N) $^{+5}_{0}$
F $^{+0.02}_{0}$ (200<F≦500···›F $^{+0.05}_{0}$, F>500···›F $^{+0.5}_{0}$)
ℓ
L $^{+0.02}_{0}$ (200<L≦500 ···› L $^{+0.05}_{0}$, L>500 ···› L $^{+0.5}_{0}$)
V±0.02
A±0.02

ℓ ≧0.7+ α

Default
α =0
※ When CX code is used
α =CX
※ When RX code is used
α =RX
※ When SR code is used
α =$\frac{V}{2}$

Step C


R≦0.5(D≦2 ···› R≦0.3)
Step R
P
Ks=45°
R≦0.2
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
T
N $^{0}_{-5}$
(F−N) $^{+5}_{0}$
F $^{+0.02}_{0}$ (200<F≦500···›F $^{+0.05}_{0}$, F>500···›F $^{+0.5}_{0}$)
ℓ
L $^{+0.02}_{0}$ (200<L≦500 ···› L $^{+0.05}_{0}$, L>500 ···› L $^{+0.5}_{0}$)
V±0.02
A±0.02

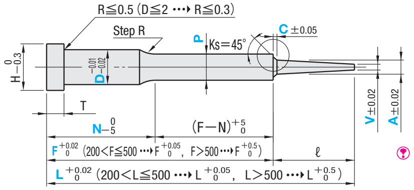
$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

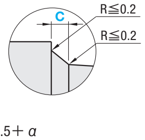
When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

Default
α =0
※ When CX code is used
α =CX
※ When RX code is used
α =RX
※ When SR code is used
α =$\frac{V}{2}$

Step D

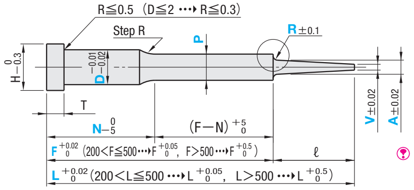

R≦0.5 (D≦2 ···› R≦0.3)
Step R
P
Ks=45°
C±0.05
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
T
N $^{0}_{-5}$
(F−N) $^{+5}_{0}$
F $^{+0.02}_{0}$ (200<F≦500 ···› F $^{+0.05}_{0}$, F>500···›F $^{+0.5}_{0}$)
ℓ
L $^{+0.02}_{0}$ (200<L≦500 ···› L $^{+0.05}_{0}$, L>500 ···› L $^{+0.5}_{0}$)
V±0.02
A±0.02

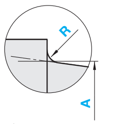


ℓ ≧C+0.5+ α

Default
α =0
※ When CX code is used
α =CX
※ When RX code is used
α =RX
※ When SR code is used
α =$\frac{V}{2}$

Step E


R≦0.5 (D≦2 ···› R≦0.3)
Step R
P
R±0.1
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
T
N $^{0}_{-5}$
(F−N) $^{+5}_{0}$
F $^{+0.02}_{0}$ (200<F≦500···›F $^{+0.05}_{0}$, F>500···›F $^{+0.5}_{0}$)
ℓ
L $^{+0.02}_{0}$ (200<L≦500 ···› L $^{+0.05}_{0}$, L>500 ···› L $^{+0.5}_{0}$)
V±0.02
A±0.02



ℓ ≧R+0.5+ α

Default
α =0
※ When CX code is used
α =CX
※ When RX code is used
α =RX
※ When SR code is used
α =$\frac{V}{2}$

Order

Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	N
CPJB−5D 10	—	160.72	—	P9.20	—	F140.00	—	A6.20	—	V5.20	—	C0.5	—	N60.0

Days to Ship **Quotation**

Non JIS material definition is listed on P.1351 - 1352

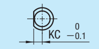
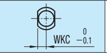
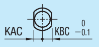
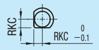
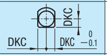
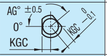
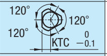
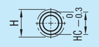
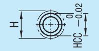
4mm head		JIS head		Part Number				L	0.01mm increments				0.1mm increments		ℓ
				Type											
H	T	H	T	4mm head	JIS head	Step	D	0.01mm increments (L>500 ···› 0.1mm increments)	P	F	A	Vmin.	C • R	N	max.
4	4	4	4	CPNB−5	CPJB−5	A B C D E	2	70.00 ~ 400.00	1.50~ 1.99	F≧50.00	P>A≧V No need to designate A when Step A is selected.	0.70	Step D only 0.1≦C≦1.5 and C<$\frac{P-A}{2}$ Step E only R≧0.3 and R≦$\frac{P-A}{2}$	N≧$\frac{L}{3}$ and F−N≧30	25
5		5					2.5		1.50~ 2.49						30
6		6					3	70.00 ~ 400.00 (500.00)	2.00~ 2.99			1.00			35
7		7					3.5		2.50~ 3.49						40
		8	6				4		3.00~ 3.99						45
8							4.5		3.50~ 4.49			1.50			50
		9					5	70.00 ~ 500.00	4.00~ 4.99						
9							5.5		5.00~ 5.49			2.00			
		10					6	70.00 ~ 500.00 (600.0)	5.00~ 5.99						
10		11					6.5		5.00~ 6.49						
							7		6.00~ 6.99						
11		13	8				8		6.00~ 7.99						
14		14					9		8.00~ 8.99						
15		15					10		8.00~ 9.99						
17		17					12	70.00 ~ 500.00 (700.0)	10.00~11.99						
—	—	20		—			15		12.00~14.99						
		21					16		15.00~15.99			2.50			

L dimension in ( ) is available only for CPJB−5. Refer to the drawing for ℓ min. (normally, α =0)

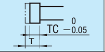
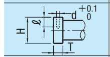
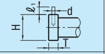
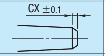
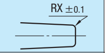
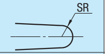
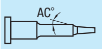
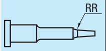
Alterations

Part Number	—	L	—	P	—	F	—	A	—	V	—	C(R)	—	N	—	(KC • WKC···etc.)
CPJB−5D 10	—	160.72	—	P9.20	—	F140.00	—	A6.20	—	V5.20	—	C0.5	—	N60.0	—	KC5.0

Alteration details P.351

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3		

KC $^{0}_{-0.1}$
WKC $^{0}_{-0.1}$
KAC
KBC $^{0}_{-0.1}$
RKC
RKC $^{0}_{-0.1}$
DKC
DKC
DKC $^{0}_{-0.1}$
AG° ±0.5
0°
KGC
KGC $^{0}_{-0.1}$
120°
120°
120°
KTC $^{0}_{-0.1}$
H
HC $^{0}_{-0.3}$
H
HCC $^{0}_{-0.02}$

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments T/2≦TC<T T−TC≦Lmax.−L (Dimensions L,F and N remain unchanged.)	Quotation
	NC	Dowel hole boring ⊗ Combination with other than NHC • NHN • CX • RX • SR • AC • RR not available. T 4, d 2, ℓ 3; T 6 / 8, d 3, ℓ 5	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC • NHN • CX • RX • SR • AC • RR not available. T 4, d 2; T 6 / 8, d 3; ℓ₁ 5	
	NHC	Numbering on the head How to order P.352	
	NHN	Automatic sequential numbering on the head How to order P.352	
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<V/2 Available when P≧2 V is a dimension prior to CX machining. ※ α =CX	
	RX	RX=0.1mm increments P≦4.5 0.3≦RX≦0.5, RX<V/2 P>4.5 0.3≦RX≦1.0 V is a dimension prior to RX machining. ※ α =RX	
	SR	Finishes the tip in spherical shape (SR). P≧2 ※ α =V/2 L $^{+0.05}_{0}$(L≦500) V is a dimension prior to SR machining.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step C • D ⊗ Combination with RR not available. When Step D, A+2(C×tanAC°)<P	
	RR	Changes R (normally 0.2 or less) to R0.3~0.5. (for Strength improvement) Designation method RR Available for Step B • C • D P−A≧1.0 When Step D, C≧0.5	

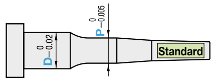
TC $^{0}_{-0.05}$
T
H
ℓ
d $^{+0.1}_{0}$
T
H
ℓ₁
d
T
217
1
2
3
CX ±0.1
RX ±0.1
SR
AC°
RR

Price **Quotation**

High Speed Steel
SKH51 equivalent

STEPPED TWO-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A・V・J・E) TOLERANCE : ±0.01 TYPE—


D 0 −0.02
P 0 −0.005
Standard

Non JIS material definition is listed on P.1351 - 1352

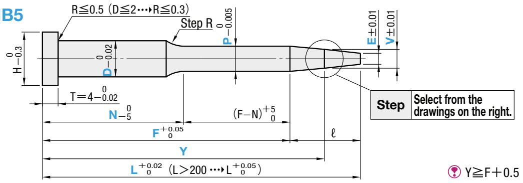
RoHS

M SKH51 equivalent Range of guaranteed shaft diameter precision (D) (Details P.1305)
H 58～60HRC Range of guaranteed base material hardness (Details P.1307)

Type	T P	Head Thickness (T)	Applicable ejector sleeve hole tolerance
C□HB5	0 −0.005	4mm (T4)	+0.005 0 Details P.1309

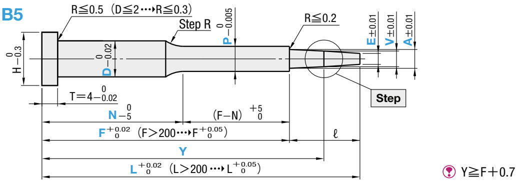
Type Step shape (in ○) is selected from the drawings on the right.

CAHB5


R≦0.5 (D≦2…R≦0.3)
Step R
P 0 −0.005
E±0.01
V±0.01
H 0 −0.3
D 0 −0.02
T=4 0 −0.02
N 0 −5
(F−N) +5 0
F +0.05 0
ℓ
Y
L +0.02 0 (L>200…L +0.05 0)
Step
Select from the drawings on the right.

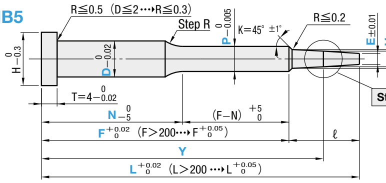
Y≧F+0.5

CBHB5


R≦0.5 (D≦2…R≦0.3)
Step R
P 0 −0.005
R≦0.2
E±0.01
V±0.01
A±0.01
H 0 −0.3
D 0 −0.02
T=4 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200…F +0.05 0)
ℓ
Y
L +0.02 0 (L>200…L +0.05 0)
Step

Y≧F+0.7

CCHB5

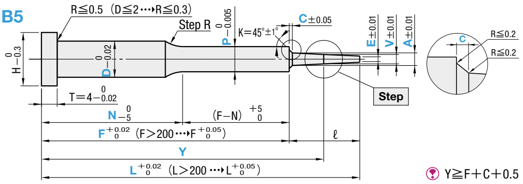

R≦0.5 (D≦2…R≦0.3)
Step R
P 0 −0.005
K=45° ±1°
R≦0.2
E±0.01
V±0.01
A±0.01
H 0 −0.3
D 0 −0.02
T=4 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200…F +0.05 0)
ℓ
Y
L +0.02 0 (L>200…L +0.05 0)
Step

$Y \geqq F+\frac{P-A}{2}+0.5$

When AC code is used

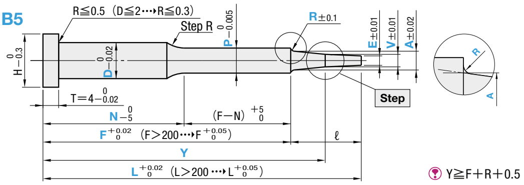
$Y \geqq F+\frac{P-A}{2\tan AC}+0.5$

CDHB5


R≦0.5 (D≦2…R≦0.3)
Step R
P 0 −0.005
K=45°±1°
C±0.05
E±0.01
V±0.01
A±0.01
C
R≦0.2
R≦0.2
H 0 −0.3
D 0 −0.02
T=4 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200…F +0.05 0)
ℓ
Y
L +0.02 0 (L>200…L +0.05 0)
Step

Y≧F+C+0.5

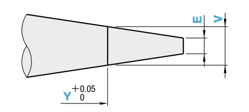
CEHB5


R≦0.5 (D≦2…R≦0.3)
Step R
P 0 −0.005
R±0.1
E±0.01
V±0.01
A±0.02
R
A
H 0 −0.3
D 0 −0.02
T=4 0 −0.02
N 0 −5
(F−N) +5 0
F +0.02 0 (F>200…F +0.05 0)
ℓ
Y
L +0.02 0 (L>200…L +0.05 0)
Step

Y≧F+R+0.5

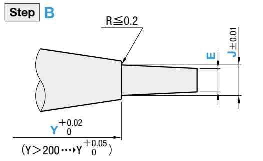
Step

Step A (V=E designation possible)



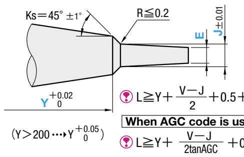
L≧Y+0.5+ α

Step B


R≦0.2
E
J±0.01
Y +0.02 0
(Y>200…Y +0.05 0)

L≧Y+0.7+ α

Step C

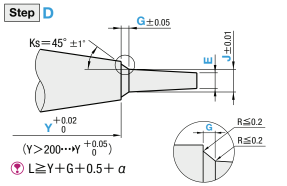

Ks=45° ±1°
R≦0.2
E
J±0.01
Y +0.02 0
(Y>200…Y +0.05 0)

$L \geqq Y+\frac{V-J}{2}+0.5+\alpha$

When AGC code is used

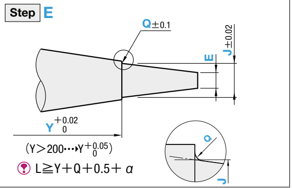
$L \geqq Y+\frac{V-J}{2\tan AGC}+0.5+\alpha$

Step D


G±0.05
Ks=45° ±1°
E
J±0.01
Y +0.02 0
(Y>200…Y +0.05 0)
G
R≦0.2
R≦0.2

L≧Y+G+0.5+ α

Step E


Q±0.1
E
J±0.02
Y +0.02 0
(Y>200…Y +0.05 0)
Q
J

L≧Y+Q+0.5+ α

Order

Part Number	—	L	—	P	—	F	—	Y	—	A	—	V	—	J	—	E	—	C・G・R・Q	—	N
CCHB5B 5	—	150.00	—	P4.80	—	F100.00	—	Y120.00	—	A4.50	—	V4.20	—	J3.80	—	E2.80			—	N30.0

Days to Ship Quotation

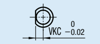
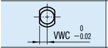
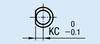
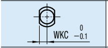
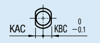
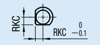
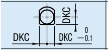
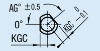
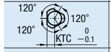
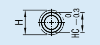
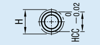
H	Part Number Type	Part Number Step	D	L	P	F	Y	A	V	J	Emin.	C・R	G・Q	N	ℓ max.
				0.01mm increments								0.1mm increments			
3	CAHB5 CBHB5 CCHB5 CDHB5 CEHB5	A B C D E	1.5	70.00～200.00	1.00～ 1.49	F≧55.00	Refer to the working limits shown in the drawing Default α=0 When CX code is used α=CX When RX code is used α=RX When SR code is used α=E/2	P>A and A≧V No need to designate A when Type CAHB5 is selected.	A≧V and V>J Designation of V=E possible when Step A is selected.	V>J and J≧E No need to designate J when Step A is selected.	0.50	when Type CDHB5 0.1≦C≦1.5 and C< (P−A)/2 when Type CEHB5 R≧0.3 and R≦ (P−A)/2	Step D only 0.1≦G≦0.5 and G< (V−J)/2 Step E only Q≧0.3 and Q≦ (V−J)/2	N≧25.0 and (F−N)≧30 and (F−N)≦200	20
4			2	70.00～250.00	1.50～ 1.99						0.70				25
5			2.5		1.50～ 2.49										30
6			3	100.00～300.00	2.00～ 2.99						1.00				35
7			3.5		2.50～ 3.49										40
			4		3.00～ 3.99										45
8			4.5		3.50～ 4.49						1.50				50
			5	100.00～350.00	4.00～ 4.99										
9			5.5		5.00～ 5.49										
			6		5.50～ 5.99						2.00				
10			6.5		6.00～ 6.49										
			7		6.50～ 6.99										
11			8		7.00～ 7.99										
14			9		8.00～ 8.99										
15			10		9.00～ 9.99										
17			12		10.00～11.99						2.50				

Type CEHB5 is D≧1.5(P≧1.10)～

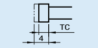
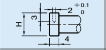
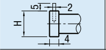
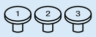
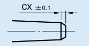
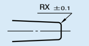
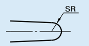
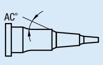
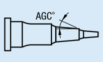
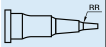
Alterations

Part Number	—	L	—	P	—	F	—	Y	—	A	—	V	—	J	—	E	—	C・G・R・Q	—	N	—	(KC・WKC…etc.)
CCHB5B 5	—	150.00	—	P4.80	—	F100.00	—	Y120.00	—	A4.50	—	V4.20	—	J3.80	—	E2.80			—	N30.0	—	WKC2.5

Alteration details P.351

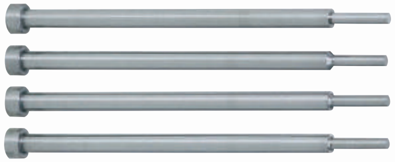
Alterations	Code	Spec.		1Code
	VKC	Single flat cutting (precision) D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	VWC	Two flats cutting (precision) D/2≦VWC<H/2		
	KC	Single flat cutting D/2≦KC<H/2		
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3		

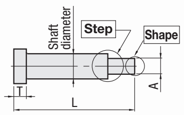
Price Quotation

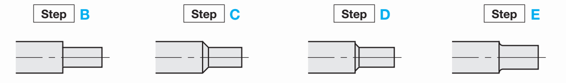
Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments 2.0≦TC<4 4−TC≦Lmax.−L (Dimensions L,Y,F and N remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 Combination with other than CX・RX・SR・AC・AGC・NHC・NHN・RR not available.	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than CX・RX・SR・AC・AGC・NHC・NHN・RR not available.	
	NHC	Numbering on the head How to order P.352 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.352 Available when H≧2	Quotation
	CX	CX=0.1mm increments 0.3≦CX≦0.5, CX<E/2 Available when P≧2 E is a dimension prior to CX machining. ※ α=CX	
	RX	RX=0.1mm increments P≦4.5 0.3≦RX≦0.5, RX<E/2 P 4.5 0.3≦RX≦1.0 Available when P≧2 E is a dimension prior to RX machining. ※ α=RX	
	SR	Finishes the tip in spherical shape (SR). Available when P≧2 L is +0.05 0 ※ α=E/2 E is a dimension prior to SR machining.	
	AC	Changes the standard angle (K=45°). AC=1° increments 30≦AC≦60 Available for Type CCHB5・CDHB5 When CDHB5, C≦1.0, A+2(C×tanAC°)<P	
	AGC	Changes the standard angle (Ks=45°). AGC=1° increments 30≦AGC≦60 Combination with RR not available Available for Step C・D When Step D , J+2 (G×tanAGC)° <V	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (for Strength improvement) Designation method RR Available for Step B・C・D P−A≧1.0 When Step D, C≧0.5	

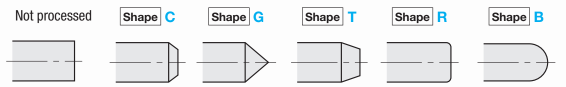
TAPERLESS CENTER PINS

TAPERLESS ONE-STEP CENTER PINS







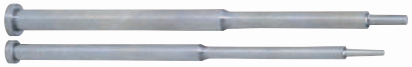


M	Head thickness (T)	Shaft diameter Tolerance	***Tip (A) tolerance $^{0}_{-0.01}$ Shaft Diameter (D) Selection Type		***Tip (A) tolerance $^{0}_{-0.01}$ Shaft diameter (P) 0.01mm increments		Tip (A) tolerance $^{0}_{-0.005}$ Shaft Diameter (D) Selection Type		Tip (A) tolerance $^{0}_{-0.005}$ Shaft diameter (P) 0.01mm increments		Center pin shaft diameter tolerance	Applicable ejector sleeve hole (V) tolerance
SKH51 equivalent	4mm (T4)	0 −0.005	CPHS−5☐	P.383	CPHSG−5☐	P.385	CPVS−5☐	P.383	CPVSG−5☐	P.385	0 −0.005	+0.005 0
		−0.01 −0.02	CPHSE−5☐	P.383	CPHSGE−5☐	P.385	CPVSE−5☐	P.383	CPVSGE−5☐	P.385	−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)	0 −0.005	CPHSJ−5☐	P.383	CPHSJG−5☐	P.385	CPVSJ−5☐	P.383	CPVSJG−5☐	P.385	0 −0.005	+0.005 0
		−0.01 −0.02	CPHSJE−5☐	P.383	CPHSJGE−5☐	P.385	CPVSJE−5☐	P.383	CPVSJGE−5☐	P.385	−0.01 −0.02	+0.01 0 or H7
SKD61 equivalent + Nitriding	4mm (T4)	*Reference tolerance −0.01 −0.02	CPNS−5☐	P.387	**CPNSG−5☐	P.389	—		—		−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)		CPJS−5☐	P.387	**CPJSG−5☐	P.389	—		—			
SKD61 equivalent + Nitriding With cooling hole	4mm (T4)	*Reference tolerance −0.01 −0.02	RDCPNS−5☐	P.391	—		—		—		−0.01 −0.02	+0.01 0 or H7
	6・8mm (JIS)		RDCPJS−5☐	P.391	—		—		—			

*The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the shaft size and/or length. For details, refer to the Catalog page of each product.
**For Dies Steel SKD61 equivalent + Nitriding, the shaft diameter is designated by 0.1 mm increments. ***For Dies Steel SKD61 equivalent + Nitriding, tip (A) tolerance is $^{0}_{-0.02}$.

TAPERLESS ONE-STEP CENTER PINS WITH COOLING HOLE

Material	SKD61 equivalent+Nitrided	**Head thickness**	4mm(T4) 6・8mm(JIS)
Part Number	RDCPNS−5☐ RDCPJS−5☐	**Tip**	$^{0}_{-0.02}$
Page	P.391	**Delivery Time**	5

Shape	M	Part Number	Page	
Stepped One-step Center Pins 	SKH51 equivalent	CPHB−5☐ CPHBJ−5☐ CPVB−5☐ CPVBJ−5☐	Listed in stepped center pin index	P.373
	SKD61 equivalent + Nitriding	CPNB−5☐ CPJB−5☐		P.375
	SKD61 equivalent	CPDB−5☐		Internet
Two-step Center Pins・Stepped Two-step Center Pins 	SKH51 equivalent	C☐H5☐ C☐HE5☐		P.371
		C☐HB5☐		P.377

Selection Method for Taperless One-step Center Pins

Code for Taperless One-step Center Pins Specification

Shaft Diameter (D) Selection Type	CP☐−5☐☐ ****RDCP☐−5☐☐
Shaft diameter (P) designation type	CP☐G(E)−5☐☐

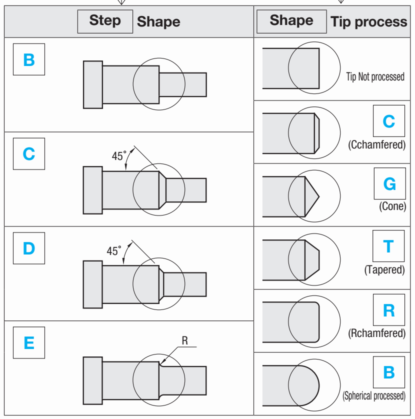
****A part-number of taperless center pin that starts by RD is in the type of taperless center pin with cooling hole.

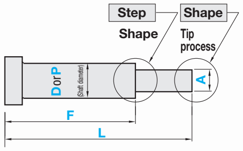
Material・tolerance codes

Shape code

Tip process code

M	Head thickness (T)	Shaft diameter Tolerance	Tip (A) tolerance ***$^{0}_{-0.01}$	Tip (A) tolerance $^{0}_{-0.005}$
SKH51 equivalent	4mm (T4)	0 −0.005	HS	VS
		−0.01 −0.02	HSE	VSE
	6・8mm (JIS)	0 −0.005	HSJ	VSJ
		−0.01 −0.02	HSJE	VJE
SKD61 equivalent + Nitriding	4mm (T4)	*Reference tolerance −0.01 −0.02	**NS	—
	6・8mm (JIS)		**JS	—





*The tolerance values for shaft diameter are representative ones. The tolerance range varies depending on the shaft size and/or length. For details, refer to the Catalog page of each product.
**For Dies Steel SKD61 equivalent + Nitriding, the shaft diameter is designated by 0.1 mm increments.
***For Dies Steel SKD61 equivalent + Nitriding, tip (A) tolerance is $^{0}_{-0.02}$.

Material characteristics of center pins

M		High Speed Steel SKH51 (M2) (1.3343)	Dies Steel SKD61 (H13) (1.2344) + Nitriding
H HRC		58～60	Surface base:900HV～ Material :40～45
Machining characteristics	Abrasion resistance	5	4
	Ability to be mirror-finished	4	3
	Toughness	3	4
	Corrosion resistance	3	3
Physical characteristics	Watt density [g/cm³]	8.2	7.75
	Modulus of longitudinal elasticity [kgf/mm²]	22300	21000
	Coefficient of thermal expansion [×10⁶/℃]	10.1	10.8
	Thermal conductivity coefficient [cal/cm・sec・℃]	0.051	0.061
Mechanical characteristics	Tensile strength [kgf/mm²]	235	135
	Charpy impact values [kgf・m/cm²]	2	4

Machining characteristics 1 (Poor) 3 (Good) 5 (Excellent)

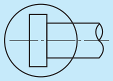
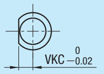
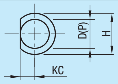
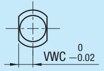
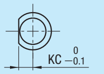
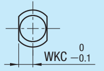
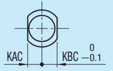
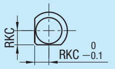
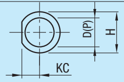
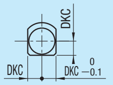
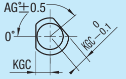
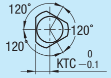
Conversion expression
1kgf/mm^2=9.81N/mm^2
1cal/cm・sec・℃=418.6W/M.K
1kgf・m/cm^2=9.81J/cm^2

Use these data for reference only as they are dependent on specific heat treatment and usage conditions.

ALTERATION GUIDE FOR TAPERLESS CENTER PINS

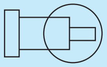
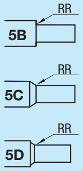
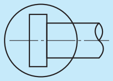
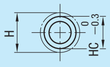
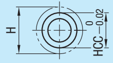
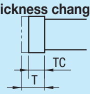
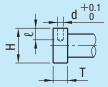
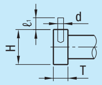
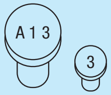
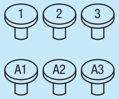
⚠ Non JIS material definition is listed on P.1351 - 1352

■Alteration Guide for Taperless Center Pins

Items	Applicable Products	Alterations	Code	Specifications		1Code
 **Key flat cutting**	**Taperless Center Pins**	**Precision key flat cutting** 	**VKC**	Precision single flat cutting ⚠ High Speed Steel SKH51 equivalent only Range of designation (DorP)/2≦VKC<H/2	To make a flat at the shaft diameter position for Straight • One-step • Two-step • Taperless and stepped types  Unit of designation • Taperless Shaft diameter selection type (D/2)·········0.05mm increments possible Shaft diameter designation (0.01mm increments) type (P/2) ·········0.005mm increments possible Shaft diameter designation (0.1mm increments) type (P/2) ·········0.05mm increments possible • Stepped Type (D/2)·························0.05mm increments possible Designation method • VKC2.82 (When P5.64) • VWC3.375 (When P6.75) • KC2.61 (When P5.22) • WKC3.085 (When P6.17) • RKC2.74 (When P5.48) • DKC3 (When D6) • KGC1.5—AG125 (When D3) • KTC3.085 (When P6.17)	Quotation
		Precision key flat cutting 	**VWC**	Precision two flats cutting ⚠ High Speed Steel SKH51 equivalent only Range of designation (DorP)/2≦VWC<H/2		
		Key flat cutting 	**KC**	Single flat cutting Range of designation (DorP)/2≦KC<H/2		
		Key flat cutting 	**WKC**	Two flats cutting Range of designation (DorP)/2≦WKC<H/2		
		Key flat cutting 	**KAC** **KBC**	Varied width parallel flats cutting Range of designation (DorP)/2≦KAC KAC<KBC<H/2		
		Key flat cutting 	**RKC**	Two flats (right angled) cutting Range of designation (DorP)/2≦RKC<H/2	To designate an arbitrary flat size  Unit of designation 0.1mm increments Designation method • VKC1.4 • VWC2.3 • KC1.4 • WKC2.3 • KAC1.4—KBC1.6 • RKC1.4 • DKC1.75 • KGC1.4—AG85 • KTC2.3	
		Key flat cutting 	**DKC**	Three flats cutting Range of designation (DorP)/2≦DKC<H/2		
		Key flat cutting (angled) 	**KGC**	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation (DorP)/2≦KGC<H/2 AG=1° increments 0° <AG<360°		
		Key flat cutting (angled) 	**KTC**	Three flats cutting at 120° Range of designation (DorP)/2≦KTC<H/2		

⚠Note that designating H/2—0.15 or more for Key flat cutting alteration will create hardly any flat on the head.

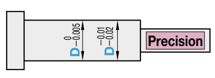
■Alteration Guide for Taperless Center Pins

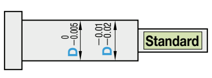
Items	Applicable Products	Alterations	Code	Specifications	1Code
 **Step alteration**	**Taperless Center Pins** **Step B** **Step C** **Step D**		**RR**	Changes R (normally 0.2 or less) to R0.3～0.5 (Improves strength) Designation method RR ⚠ Available for Step B • C • D ⚠ D(P)—A≧1.0 ⚠ when Step D, C≧0.5	
 **Head alteration**	**Taperless Center Pins**	**Head diameter change** 	**HC**	Reduces the head diameter. Range of designation DorP≦HC<H ⚠ Available when DorP≧1.5 ⚠ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft. Unit of designation 0.1mm increments Designation method HC6.5	Quotation
		Head diameter change (precision) 	**HCC**	Reduces the head diameter. (Precision) Range of designation DorP+0.5≦HCC<H—0.3 ⚠Available when DorP≧1.5 Unit of designation 0.1mm increments Designation method HCC6.1	
		Head thickness change 	**TC**	Reduces the head thickness. Dimensions L,Y,F and N remain unchanged. Range of designation T/2≦TC<T ⚠T—TC≦Lmax.—L ⚠Available when DorP≧1.5 Unit of designation 0.1mm increments Designation method TC3.5	
		Dowel hole boring 	**NC**	Adds a dowel hole. ⚠Available when head diameter ≧4 Designation method NC T d ℓ 4 2 3 6 3 5 8 ⊗ Combination with other than NHC • NHN • RR not available.	
		Dowel hole+Spring pin 	**NCW**	Adds a dowel hole+ and drives a spring pin. ⚠ Available when head diameter≧4 Designation method NCW T d ℓ_1 4 2 5 6 3 8 ⊗ Combination with other than NHC • NHN • RR not available.	
		Numbering 	**NHC**	Numbering on the head Electrolytic marking of ID code on the head(in 5 point, Round Gothic type) Available characters Numerals: 0～9; Alphabets: A～Z Range of designation 1 character when 2≦H<4.9 1 or 2 characters when 5≦H<6.9 (Only the first character may be an alphabet.) Up to 3 characters when 7≦H (Only the first character may be an alphabet.) Designation method NHC—6, NHC—23, NHC—A90 ⚠ Available when head diameter H≧2	
		Numbering 	**NHN**	Automatic sequential numbering on the head Adds a sequential number on the head of each ejector pin when two or more pieces of identical size are ordered. Available characters Same as NHC (see above) Range of designation Same as NHC (see above) Designation method When 3 pieces are ordered with NHN—1, a sequential number starting from 1 is added on the head of each piece. When 10 pieces pins are ordered with NHN—A15, a sequential number starting from A15 (through A24) is added on the head of each piece. ⚠ Available when head diameter H≧2 ⚠ Only available when two or more pieces of identical size are ordered.	

High Speed Steel
SKH51 equivalent
D $^{0}_{-0.005}$ ／ $^{-0.01}_{-0.02}$

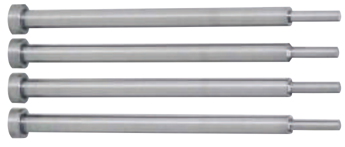
TAPERLESS ONE-STEP CENTER PINS

—SHAFT DIAMETER (D) FIXED TIP (A) TOLERANCE $^{0}_{-0.005}$ ／ $^{0}_{-0.01}$ TYPE—


D $^{0}_{-0.005}$
D' $^{-0.01}_{-0.02}$
Precision


D $^{0}_{-0.005}$
D' $^{-0.01}_{-0.02}$
Standard

Non JIS material definition is listed on P.1351 - 1352



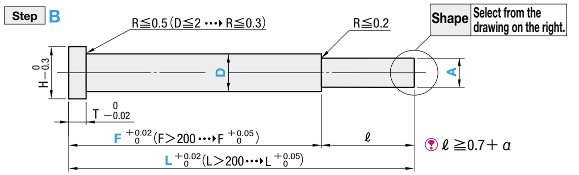
RoHS

M SKH51 equivalent Range of guaranteed shaft diameter precision (Details ☞ P.1305)
H 58～60HRC Range of guaranteed base material hardness (Details ☞ P.1307)

Type	**T** D	Head thickness (T)	Applicable ejector sleeve hole tolerance
CPHS—5	$^{0}_{-0.005}$	4mm (T4)	$^{+0.005}_{0}$ Details ☞ P.1309
CPVS—5			
CPHSJ—5		6・8mm (JIS)	
CPVSJ—5			
CPHSE—5	$^{-0.01}_{-0.02}$	4mm (T4)	$^{+0.01}_{0}$ or H7 Details ☞ P.1309
CPVSE—5			
CPHSJE—5		6・8mm (JIS)	
CPVSJE—5			

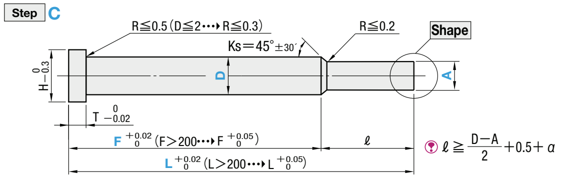
Step (Step type) Select from B～E in the drawing below.

Step B


R≦0.5 (D≦2 ⋯ R≦0.3)
R≦0.2
Shape
Select from the drawing on the right.
H $^{0}_{-0.3}$
D
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ⋯ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ⋯ L $^{+0.05}_{0}$)

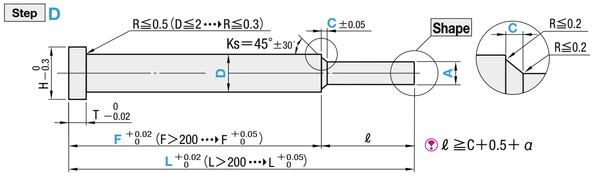
ℓ≧0.7+α

Step C


R≦0.5 (D≦2 ⋯ R≦0.3)
R≦0.2
Ks=45°±30′
Shape
H $^{0}_{-0.3}$
D
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ⋯ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ⋯ L $^{+0.05}_{0}$)

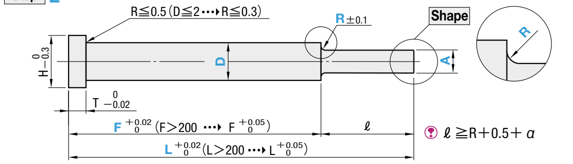
ℓ≧ (D−A)/2 +0.5+α

Step D


R≦0.5 (D≦2 ⋯ R≦0.3)
C±0.05
Ks=45°±30′
Shape
C
R≦0.2
R≦0.2
H $^{0}_{-0.3}$
D
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ⋯ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ⋯ L $^{+0.05}_{0}$)

ℓ≧C+0.5+α

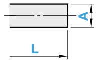
Step E


R≦0.5 (D≦2 ⋯ R≦0.3)
R±0.1
Shape
R
H $^{0}_{-0.3}$
D
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ⋯ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ⋯ L $^{+0.05}_{0}$)

ℓ≧R+0.5+α

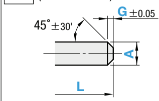
Shape (Tip shape)

(Not processed)



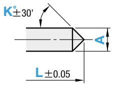
Designation of the shape is unnecessary when tip processing is not required.
α=0

C (C chamfered)


45°±30′
G±0.05
A
L

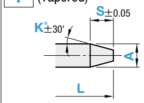
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)



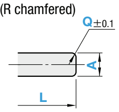
0<K≦60
1° increments
α = A/(2tanK)

T (Tapered)



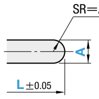
0.1≦S< A/(2tanK)
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfered)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)



α=A/2

Group	Type		Shape (Tip shapeA) **T**			
	4mm head	JIS head	Step B	Step C	Step D	Step E
Standard	CPHS—5□	CPHSJ—5□	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$
Precision	CPVS—5□	CPVSJ—5□	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$
Standard	CPHSE—5□	CPHSJE—5□	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$
Precision	CPVSE—5□	CPVSJE—5□	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$

4mm head		JIS head		Part Number					0.01mm increments				0.1mm increments	ℓmax.
H	T	H	T	Type 4mm head	Type JIS head	Step	Shape	D	L	F	A	Amin.	C・R	
3	4	—	—	CPHS—5 CPVS—5 Tolerance D $^{0}_{-0.005}$ CPHSE—5 CPVSE—5 Tolerance D $^{-0.01}_{-0.02}$	— CPHSJ—5 CPVSJ—5 Tolerance D $^{0}_{-0.005}$ CPHSJE—5 CPVSJE—5 Tolerance D $^{-0.01}_{-0.02}$	B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1	70.00～200.00	F≧50.00	When tolerance D $^{0}_{-0.005}$ D−0.01>A≧Amin. When tolerance D $^{-0.01}_{-0.02}$ D−0.02>A≧Amin.	0.50	Step D only 0.1≦C≦1.5 and C< (D−A)/2 Step E only R≧0.3 and R≦ (D−A)/2	ℓ≦12×A and ℓ≦35
								1.5	70.00～250.00					
4								2				0.70		
5								2.5						
6								3	70.00～300.00			1.00		
7								3.5						
		8	6					4						
8								4.5				1.50		
		9						5	70.00～350.00					
9								5.5				2.00		
		10						6						
10		11						6.5						
								7						
11		13	8					8						
14		14						9						
15		15						10						
17		17						12						

Step E is D≧1.5 Refer to the drawing for ℓmin.(normally, α=0)

Order

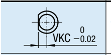
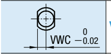
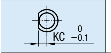
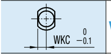
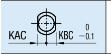
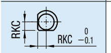
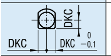
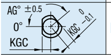
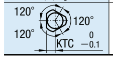
Part Number	—	L	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)
CPHS—5EG6	—	350.00	—	F330.00	—	A5.00	—	R0.5	—	K30

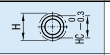
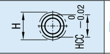
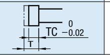
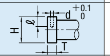
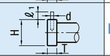
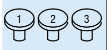
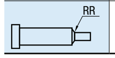
Days to Ship Quotation

Alterations

Part Number	—	L	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPHS—5EG6	—	350.00	—	F330.00	—	A5.00	—	R0.5	—	K30	—	KC3.0

Alteration details ☞ P.381

Alterations	Code	Spec.		1Code
 VKC $^{0}_{-0.02}$	VKC	Precision single flat cutting D/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 VWC $^{0}_{-0.02}$	VWC	Precision two flats cutting D/2≦VWC<H/2		
 KC $^{0}_{-0.1}$	KC	Single flat cutting D/2≦KC<H/2		
 WKC $^{0}_{-0.1}$	WKC	Two flats cutting D/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.1}$	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.1}$	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

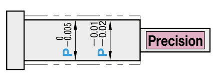
Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	HC	HC=0.1mm increments D≦HC<H, D≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC $^{0}_{-0.02}$	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3, D≧1.5	
 TC $^{0}_{-0.02}$ T	TC	TC=0.1mm increments T/2≦TC<T, D≧1.5 T TC≦Lmax. L (Dimensions L and F remain unchanged.)	
 H ℓ d $^{+0.1}_{0}$ T	NC	Dowel hole boring Available when H≧4 ⊗ Combination with other than NHC・NHN・RR not available. T / d / ℓ: 4 / 2 / 3; 6, 8 / 3 / 5	Quotation
 H ℓ₁ d T	NCW	Dowel hole boring+Spring pin driving Available when H≧4 ⊗ Combination with other than NHC・NHN・RR not available. T / d / ℓ₁: 4 / 2 / 5; 6, 8 / 3 / 5	
217	NHC	Numbering on the head How to order ☞ P.382 Available when H≧2	
 1 2 3	NHN	Automatic sequential numbering on the head How to order ☞ P.382 Available when H≧2	
 RR	RR	Changes R (normally 0.2 or less) to R0.3～0.5 (Improves strength) Designation method RR Available for Step B・C・D D−A≧1.0 Step When D, C≧0.5	

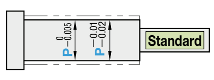
Price Quotation

High Speed Steel SKH51 equivalent
P $^{0}_{-0.005}$ / $^{-0.01}_{-0.02}$

TAPERLESS ONE-STEP CENTER PINS

— SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TIP (A) TOLERANCE $^{0}_{-0.005}$ / $^{0}_{-0.01}$ TYPE—


P $^{0}_{-0.005}$
P $^{-0.01}_{-0.02}$
Precision


P $^{0}_{-0.005}$
P $^{-0.01}_{-0.02}$
Standard

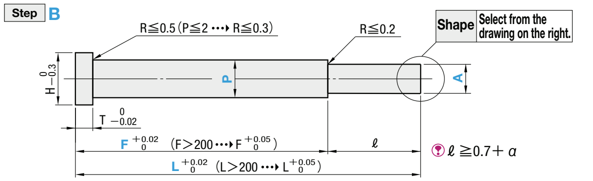
Non JIS material definition is listed on P.1351 - 1352

M SKH51 equivalent — Range of guaranteed shaft diameter precision(Details P.1305)
H 58～60HRC — Range of guaranteed base material hardness(Details P.1307)

Type	T P	Head thickness (T)	Applicable ejector sleeve hole tolerance
CPHSG−5	0 −0.005	4mm (T4)	$^{+0.005}_{0}$ Details P.1309
CPVSG−5			
CPHSJG−5		6・8mm (JIS)	
CPVSJG−5			
CPHSGE−5	−0.01 −0.02	4mm (T4)	$^{+0.01}_{0}$ or H7 Details P.1309
CPVSGE−5			
CPHSJGE−5		6・8mm (JIS)	
CPVSJGE−5			

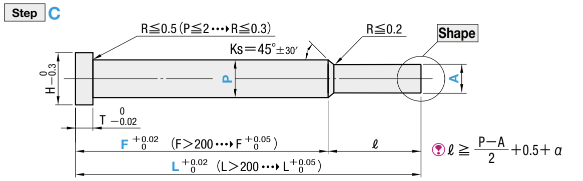
Step (Step type) Select from B～E in the drawing below.

Step B


R≦0.5 (P≦2 ···› R≦0.3)
R≦0.2
Shape Select from the drawing on the right.
H −0.3 0
P
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

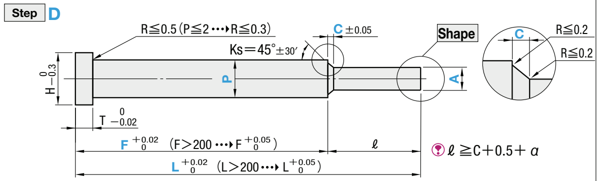
ℓ≧0.7+α

Step C


R≦0.5 (P≦2 ···› R≦0.3)
R≦0.2
Ks=45° ±30′
Shape
H −0.3 0
P
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

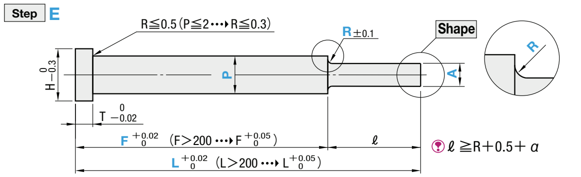
ℓ≧ $\frac{P-A}{2}$ +0.5+α

Step D


R≦0.5 (P≦2 ···› R≦0.3)
C ±0.05
R≦0.2
Ks=45° ±30′
Shape
C
R≦0.2
H −0.3 0
P
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ℓ≧C+0.5+α

Step E

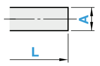

R≦0.5 (P≦2 ···› R≦0.3)
R ±0.1
Shape
R
H −0.3 0
P
A
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$ (F>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ℓ≧R+0.5+α

Shape (Tip shape)

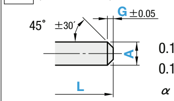
(Not processed)

Designation of the shape is unnecessary when tip processing is not required.



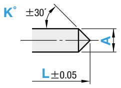
α=0

C (C chamfered)


45° ±30′
G ±0.05
A
L

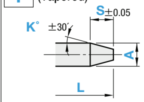
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)



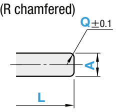
0<K≦60
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)



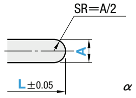
$0.1\leqq S<\frac{A}{2\tan K}$
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfered)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)



α=A/2

Group	Type 4mm head	Type JIS head	Shape (Tip shapeA) T Step B	Step C	Step D	Step E
Standard	CPHSG−5□	CPHSJG−5□	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$
Precision	CPVSG−5□	CPVSJG−5□	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$
Standard	CPHSGE−5□	CPHSJGE−5□	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$	A $^{0}_{-0.01}$
Precision	CPVSGE−5□	CPVSJGE−5□	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$	A $^{0}_{-0.005}$

4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	Shape	No.	0.01mm increments L	P	F	A	Amin.	0.1mm increments C・R	ℓmax.
3	4	—	—	CPHSG−5 CPVSG−5 Tolerance P $^{0}_{-0.005}$ CPHSGE−5 CPVSGE−5 Tolerance P $^{-0.01}_{-0.02}$	—	B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1	70.00～150.00	0.80～ 0.99	F≧50.00	When tolerance P $^{0}_{-0.005}$ P−0.01>A≧Amin. When tolerance P $^{-0.01}_{-0.02}$	0.50	Step D only 0.1≦C≦1.5 and $C<\frac{P-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{P-A}{2}$	ℓ≦12×A and ℓ≦35
									150.01～200.00	0.90～ 0.99					
								1.5	70.00～250.00	1.00～ 1.49					
4								2		1.50～ 1.99			0.70		
5								2.5		2.00～ 2.49					
6								3	70.00～300.00	2.50～ 2.99			1.00		
7								3.5		3.00～ 3.49					
		8	6		CPHSJG−5 CPVSJG−5 Tolerance P $^{0}_{-0.005}$ CPHSJGE−5 CPVSJGE−5 Tolerance P $^{-0.01}_{-0.02}$			4		3.50～ 3.99					
8								4.5		4.00～ 4.49			1.50		
		9						5	70.00～350.00	4.50～ 4.99					
9								5.5		5.00～ 5.49			2.00		
		10						6		5.50～ 5.99					
10		11						6.5		6.00～ 6.49					
								7		6.50～ 6.99					
11		13	8					8		7.00～ 7.99					
15		15						10		8.00～ 9.99					
17		17						12		10.00～11.99					

Shape C・G・T・R・B is No.1.5(P≧1.00)～ Step E is No.1.5(P≧1.10)～ Refer to the drawing for ℓmin.(normally, α=0)

Order

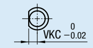
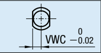
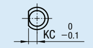
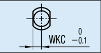
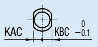
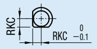
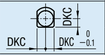
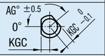
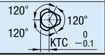
Part Number — L — P — F — A — C(R) — Tip size (K・S・G・Q)
CPHSG−5E6 — 350.00 — P5.95 — F330.00 — A4.95 — R0.5

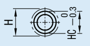
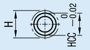
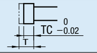
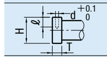
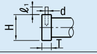
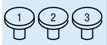
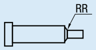
Days to Ship Quotation

Alterations

Part Number — L — p — F — A — C(R) — Tip size (K・S・G・Q) — (KC・WKC···etc.)
CPHSG−5E6 — 350.00 — P5.95 — F330.00 — A4.95 — R0.5 — KC3.0

Alteration details P.381

Alterations	Code	Spec.		1Code
	VKC	Precision single flat cutting P/2≦VKC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	VWC	Precision two flats cutting P/2≦VWC<H/2		
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

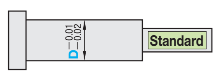
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P≦HC<H, P≧1.5 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3, P≧1.5	
	TC	TC=0.1mm increments T/2≦TC<T, P≧1.5 T TC≦Lmax. L (Dimensions L and F remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・RR not available. T 4 / d 2 / ℓ 3; T 6, 8 / d 3 / ℓ 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・RR not available. T 4 / d 2; T 6, 8 / d 3; ℓ₁ 5	
	NHC	Numbering on the head How to order P.382 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.382 Available when H≧2	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5 (Improves strength) Designation method RR Available for Step B・C・D P−A≧1.0 Step When D, C≧0.5	

Price Quotation

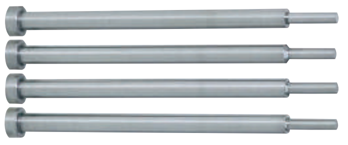
Dies Steel
SKD61 equivalent+Nitrided
D$^{-0.01}_{-0.02}$

TAPERLESS ONE-STEP CENTER PINS

—SHAFT DIAMETER (D) FIXED TIP (A) TOLERANCE$^{\ 0}_{-0.02}$ TYPE—


D$^{-0.01}_{-0.02}$
Standard

Non JIS material definition is listed on P.1351 - 1352



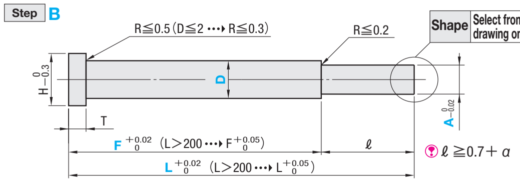
M SKD61 equivalent+Nitrided
H Surface 900HV~
Base material 40~45HRC

Range of guaranteed shaft diameter precision (Details P.1305) Range of guaranteed surface hardness for nitriding (Details P.1308)
Range of guaranteed base material hardness (Details P.1307) No nitriding on the tip (ℓ).

Type	T D	Head thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPNS−5	$^{-0.01}_{-0.02}$ D>12 ···› D$^{-0.01}_{-0.03}$	4mm (T4)	$^{\ 0}_{-0.02}$ (L>300 ···›T$^{\ 0}_{-0.05}$)	$^{+0.01}_{\ 0}$ or H7 Details P.1309
CPJS−5		6・8mm (JIS)	$^{\ 0}_{-0.05}$	

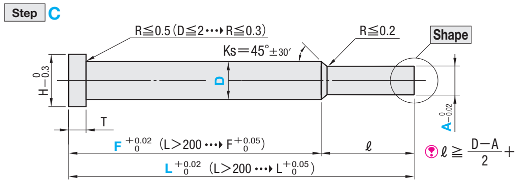
Step (Step type) Select from B~E in the drawing below.

Step B


R≦0.5 (D≦2 ···› R≦0.3)
R≦0.2
Shape Select from the drawing on the right.
H$^{\ 0}_{-0.3}$
D
A$^{\ 0}_{-0.02}$
T
F$^{+0.02}_{\ 0}$ (L>200 ···› F$^{+0.05}_{\ 0}$)
ℓ
L$^{+0.02}_{\ 0}$ (L>200 ···› L$^{+0.05}_{\ 0}$)

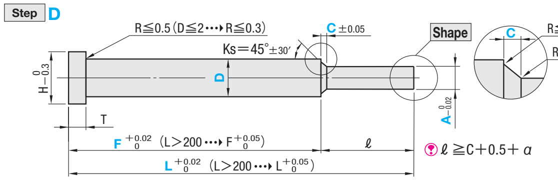
$\ell \geqq 0.7+\alpha$

Step C


R≦0.5 (D≦2 ···› R≦0.3)
Ks=45°±30′
R≦0.2
Shape
H$^{\ 0}_{-0.3}$
D
A$^{\ 0}_{-0.02}$
T
F$^{+0.02}_{\ 0}$ (L>200 ···› F$^{+0.05}_{\ 0}$)
ℓ
L$^{+0.02}_{\ 0}$ (L>200 ···› L$^{+0.05}_{\ 0}$)

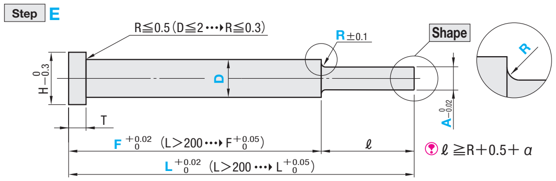
$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

Step D


R≦0.5 (D≦2 ···› R≦0.3)
C ±0.05
Ks=45°±30′
Shape
C
R≦0.2
R≦0.2
H$^{\ 0}_{-0.3}$
D
A$^{\ 0}_{-0.02}$
T
F$^{+0.02}_{\ 0}$ (L>200 ···› F$^{+0.05}_{\ 0}$)
ℓ
L$^{+0.02}_{\ 0}$ (L>200 ···› L$^{+0.05}_{\ 0}$)

$\ell \geqq C+0.5+\alpha$

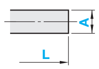
Step E


R≦0.5 (D≦2 ···› R≦0.3)
R±0.1
Shape
R
H$^{\ 0}_{-0.3}$
D
A$^{\ 0}_{-0.02}$
T
F$^{+0.02}_{\ 0}$ (L>200 ···› F$^{+0.05}_{\ 0}$)
ℓ
L$^{+0.02}_{\ 0}$ (L>200 ···› L$^{+0.05}_{\ 0}$)

$\ell \geqq R+0.5+\alpha$

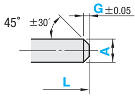
Shape (Tip shape)

(Not processed)



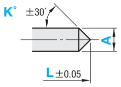
Designation of the shape is unnecessary when tip processing is not required.
$\alpha=0$

C (C chamfered)


45° ±30′
G±0.05
A
L

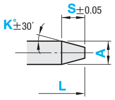
$0.1\leqq G<A/2$
0.1mm increments
$\alpha=G$

G (Cone)



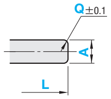
$0<K\leqq60$
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)



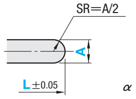
$0.1\leqq S<\frac{A}{2\tan K}$
0.1mm increments
$0<K\leqq45$
1° increments
$\alpha=S$

R (R chamfered)



$0.2\leqq Q<A/2$
0.1mm increments
$\alpha=Q$

B (Spherical processed)



$\alpha=A/2$

Order

Part Number	—	L	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)
CPNS−5EG6	—	350.00	—	F330.00	—	A5.00	—	R0.5	—	K30

Days to Ship Quotation

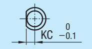
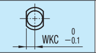
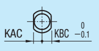
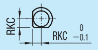
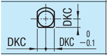
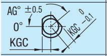
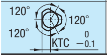
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	Shape	D	0.01mm increments L	0.01mm increments F	A	Amin.	0.1mm ncrements C・R	ℓmax.
3	4	—	—	CPNS−5	—	B C D E	Designation is unnecessary when tip processing is not required. C G T R B	1.5	70.00~200.00	F≧50.00	D−0.02>A≧Amin.	0.50	Step D only $0.1\leqq C\leqq1.5$ and $C<\frac{D-A}{2}$ Step E only $R\geqq0.3$ and $R\leqq\frac{D-A}{2}$	ℓ≦12×A and ℓ≦35
4								2	70.00~400.00 (500.00)			0.70		
5								2.5						
6								3				1.00		
7								3.5						
		8	6		CPJS−5			4						
8								4.5				1.50		
		9						5	70.00~500.00					
9								5.5				2.00		
		10						6						
10		11						6.5						
								7						
11		13	8					8						
14		14						9						
15		15						10						
17		17						12						
—	—	21		—				16				2.50		

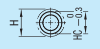
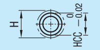
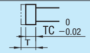
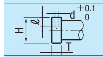
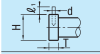
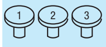
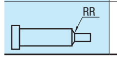
Refer to the drawing for ℓmin.(normally, $\alpha=0$) L dimension in ( ) is available for CPJS−5 only. Step E is D≧2

Alterations

Part Number	—	L	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPNS−5EG6	—	350.00	—	F330.00	—	A5.00	—	R0.5	—	G2.0	—	KC3.0

Alteration details P.381

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{\ 0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{\ 0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{\ 0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

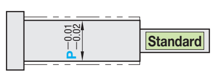
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3	
	TC	TC=0.1mm increments T/2≦TC<T T TC≦Lmax. L (Dimensions L and F remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・RR not available. T d ℓ 4 2 3 6 3 5 8	Quotation
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・RR not available. T d ℓ_1 4 2 5 6 3 8	
	NHC	Numbering on the head How to order P.382 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.382 Available when H≧2	
	RR	Changes R (normally 0.2 or less) to R0.3~0.5 (Improves strength) Designation method RR Available for Step B・C・D D−A≧1.0 Step When D, C≧0.5	

P Price Quotation

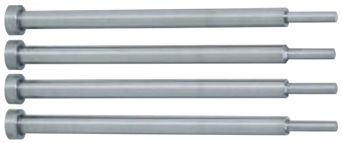
Dies Steel
SKD61 equivalent+Nitrided
P $^{-0.01}_{-0.02}$

TAPERLESS ONE-STEP CENTER PINS

—SHAFT DIAMETER (P) DESIGNATION (0.1mm INCREMENTS) TIP (A) TOLERANCE $^{0}_{-0.02}$ TYPE—


P $^{-0.01}_{-0.02}$
Standard

Non JIS material definition is listed on P.1351 - 1352

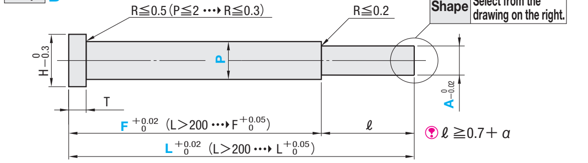


M SKD61 equivalent+Nitrided Range of guaranteed shaft diameter precision (Details P.1305) Range of guaranteed surface hardness for nitriding (Details P.1308)
H Surface 900HV Range of guaranteed base material hardness (Details P.1307) No nitriding on the tip (ℓ).
Base material 40～45HRC

Type	T P	Head thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
CPNSG−5	−0.01 −0.02 P>12 ···› P $^{-0.01}_{-0.03}$	4mm (T4)	0 −0.02 (L>300 ···›T $^{0}_{-0.05}$)	$^{+0.01}_{0}$ or H7 Details P.1309
CPJSG−5		6・8mm (JIS)	0 −0.05	

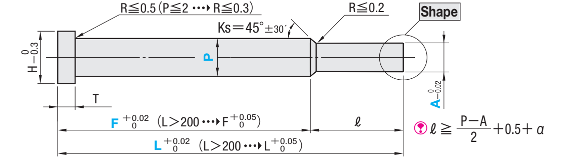
Step (Step type) Select from B～E in the drawing below.

Step B


R≦0.5 (P≦2 ···› R≦0.3)
R≦0.2
Shape Select from the drawing on the right.
H−0.3
P
T
A−0.02
F $^{+0.02}_{0}$ (L>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

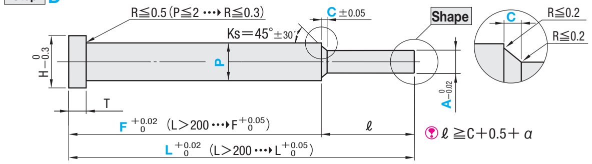
ℓ≧0.7+α

Step C


R≦0.5 (P≦2 ···› R≦0.3)
Ks=45°±30'
R≦0.2
Shape
H−0.3
P
T
A−0.02
F $^{+0.02}_{0}$ (L>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

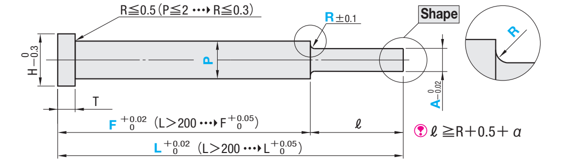
$ℓ ≧ \frac{P-A}{2} + 0.5 + α$

Step D


R≦0.5 (P≦2 ···› R≦0.3)
Ks=45°±30'
C±0.05
Shape
C
R≦0.2
R≦0.2
H−0.3
P
T
A−0.02
F $^{+0.02}_{0}$ (L>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ℓ≧C+0.5+α

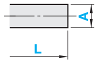
Step E


R≦0.5 (P≦2 ···› R≦0.3)
R±0.1
Shape
R
H−0.3
P
T
A−0.02
F $^{+0.02}_{0}$ (L>200 ···› F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···› L $^{+0.05}_{0}$)

ℓ≧R+0.5+α

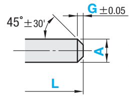
Shape (Tip shape)

(Not processed)



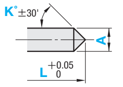
Designation of the shape is unnecessary when tip processing is not required.
α=0

C (C chamfered)


G±0.05
45°±30'
A
L

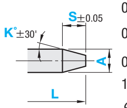
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)



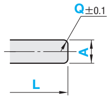
0<K≦60
1° increments
$α = \frac{A}{2\tan K}$

T (Tapered)



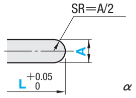
$0.1 ≦ S < \frac{A}{2\tan K}$
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfered)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)


SR=A/2
A
L $^{+0.05}_{0}$

α=A/2

Order

Part Number	—	L	—	P	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)
CPNSG−5ER6	—	350.00	—	P5.9	—	F330.00	—	A4.95	—	R0.5	—	Q1.5

Days to Ship **Quotation**

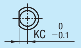
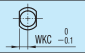
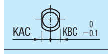
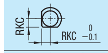
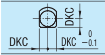
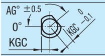
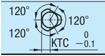
4mm head H	4mm head T	JIS head H	JIS head T	Part Number Type 4mm head	Part Number Type JIS head	Step	Shape	No.	L (0.01mm increments)	P (0.01mm increments)	F (0.01mm increments)	A (0.01mm increments)	Amin. (0.01mm increments)	C・R (0.01mm increments)	ℓmax.
4	4	—	—	CPNSG−5	—	B C D E	Designation is unnecessary when tip processing is not required. C G T R B	2	70.00～400.00 (500.00)	1.5～ 1.9	F≧50.00	P−0.02>A≧Amin.	0.70	Step D only 0.1≦C≦1.5 and $C < \frac{P-A}{2}$ Step E only R≧0.3 and $R ≦ \frac{P-A}{2}$	ℓ≦12×A and ℓ≦35
5								2.5		2.0～ 2.4					
6								3		2.5～ 2.9			1.00		
7								3.5		3.0～ 3.4					
		8	6		CPJSG−5			4		3.5～ 3.9					
8								4.5		4.0～ 4.4			1.50		
		9						5	70.00～500.00	4.5～ 4.9					
9								5.5		5.0～ 5.4			2.00		
		10						6		5.5～ 5.9					
10		11						6.5		6.0～ 6.4					
								7		6.5～ 6.9					
11		13	8					8		7.0～ 7.9					
15		15						10		8.0～ 9.9					
17		17						12		10.0～11.9					
—	—	20		—				15		12.0～14.9					
		21						16		15.0～15.9			2.50		

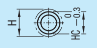
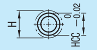
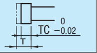
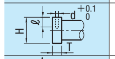
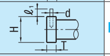
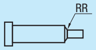
Refer to the drawing for ℓmin.(normally, α=0) L dimension in ( ) is CPJSG−5 only. Step E is P≧2

Alterations

Part Number	—	L	—	P	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPNSG−5ER6	—	350.00	—	P5.9	—	F330.00	—	A4.95	—	R0.5	—	Q1.0	—	KC3.0

Alteration details P.381

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

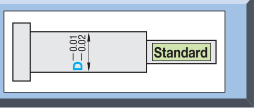
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	HCC=0.1mm increments P+1≦HCC<H−0.3	
	TC	TC=0.1mm increments T/2≦TC<T T TC≦Lmax. L (Dimensions L and F remain unchanged.)	
	NC	Dowel hole boring Available when H≧4 Combination with other than NHC・NHN・RR not available. T / d / ℓ: 4 / 2 / 3; 6 / 3 / 5; 8 / 3 / 5	
	NCW	Dowel hole boring+Spring pin driving Available when H≧4 Combination with other than NHC・NHN・RR not available. T / d / ℓ₁: 4 / 2 / 5; 6 / 3 / 5; 8 / 3 / 5	
	NHC	Numbering on the head How to order P.382 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.382 Available when H≧2	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5 (Improves strength) Designation method RR Available for Step B・C・D P−A≧1.0 Step When D, C≧0.5	

Price **Quotation**

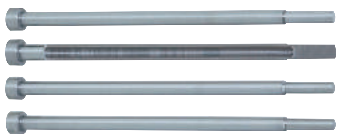
Dies Steel
SKD61 equivalent+Nitrided
$D^{-0.01}_{-0.02}$

TAPERLESS ONE-STEP CENTER PINS WITH COOLING HOLE

—SHAFT DIAMETER (D) FIXED TIP (A) TOLERANCE $^{0}_{-0.02}$ TYPE—


D −0.01 −0.02
Standard

Non JIS material definition is listed on P.1351 - 1352

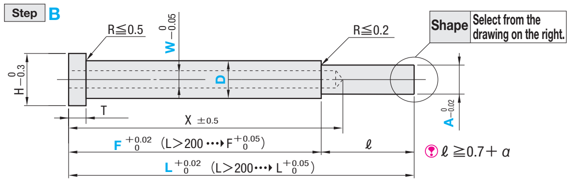

RoHS

M SKD61 equivalent+Nitrided Range of guaranteed shaft diameter precision (Details P.1305) Range of guaranteed surface hardness for nitriding (Details P.1308)
H Surface 900HV~ Base material 40±3HRC Range of guaranteed base material hardness (Details P.1307) No nitriding on the tip (ℓ). No nitriding to the cooling hole.

Type	T D	Head thickness (T)	T Head Thickness (T)	Applicable ejector sleeve hole tolerance
RDCPNS−5	−0.01 −0.02 D>12 ··· D −0.01 −0.03	4mm (T4)	0 −0.02	$^{+0.01}_{0}$ or H7 Details P.1309
RDCPJS−5		6・8mm (JIS)	0 −0.05	

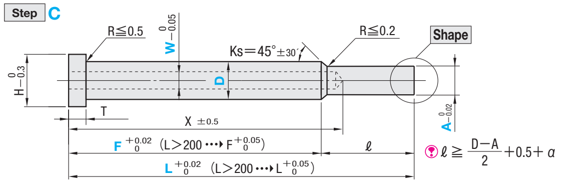
Step (Step type) Select from B~E in the drawing below.

Step B


R≦0.5
W $^{0}_{-0.05}$
R≦0.2
Shape Select from the drawing on the right.
H $^{0}_{-0.3}$
D
T
X ±0.5
F $^{+0.02}_{0}$ (L>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
A $^{0}_{-0.02}$

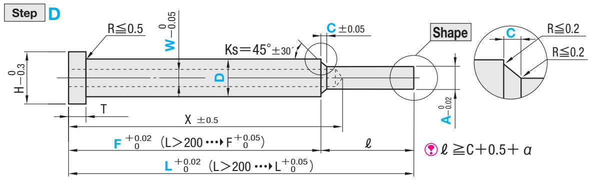
ℓ≧0.7+α

Step C


R≦0.5
W $^{0}_{-0.05}$
Ks=45°±30'
R≦0.2
Shape
H $^{0}_{-0.3}$
D
T
X ±0.5
F $^{+0.02}_{0}$ (L>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
A $^{0}_{-0.02}$

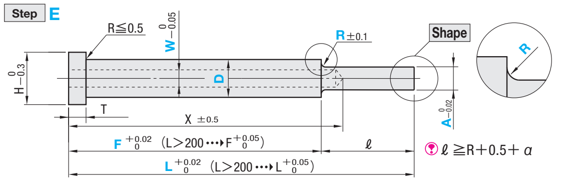
$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

Step D


R≦0.5
W $^{0}_{-0.05}$
Ks=45°±30'
C ±0.05
Shape
C
R≦0.2
R≦0.2
H $^{0}_{-0.3}$
D
T
X ±0.5
F $^{+0.02}_{0}$ (L>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
A $^{0}_{-0.02}$

ℓ≧C+0.5+α

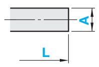
Step E


R≦0.5
W $^{0}_{-0.05}$
R ±0.1
Shape
R
H $^{0}_{-0.3}$
D
T
X ±0.5
F $^{+0.02}_{0}$ (L>200 ···▸ F $^{+0.05}_{0}$)
ℓ
L $^{+0.02}_{0}$ (L>200 ···▸ L $^{+0.05}_{0}$)
A $^{0}_{-0.02}$

ℓ≧R+0.5+α

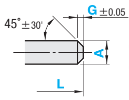
Shape (Tip shape)

(Not processed)



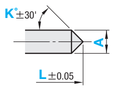
Designation of the shape is unnecessary when tip processing is not required.
α=0

C (C chamfered)


45°±30'
G ±0.05
A
L

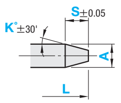
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)



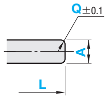
0<K≦60
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)



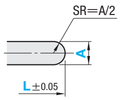
$0.1 \leqq S < \frac{A}{2\tan K}$
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfered)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)



α=A/2

Order

Part Number	—	L	—	F	—	A	—	C(R)	—	Tip size (K・S・G・Q)	—	W
RDCPNS−5EG8	—	140.00	—	F110.00	—	A6.50	—	R0.5	—	K30	—	W4.0

Days to Ship Quotation

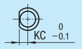
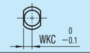
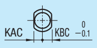
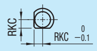
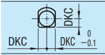
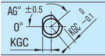
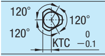
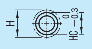
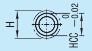
4mm head H	4mm head T	JIS head H	JIS head T	Type 4mm head	Type JIS head	Step	Shape	D	L (0.01mm increments)	F (0.01mm increments)	A (0.01mm increments)	Amin.	C・R (0.1mm increments)	W (0.5mm increments)	ℓmax.	X
9	4	10	6	RDCPNS−5	RDCPJS−5	B C D E	Designation is unnecessary when tip processing is not required. C G T R B	6	70.00~150.00	F≧50.00	D−0.02>A≧Amin.	5.00	Step D only 0.1≦C≦1.5 and $C<\frac{D-A}{2}$ Step E only R≧0.3 and $R\leqq\frac{D-A}{2}$	3.0	ℓ≦12XA and ℓ≦35	*Refer to under
10		11						7				6.00		3.0		L−10
11		13	8					8	70.00~200.00			7.00		4.0		
15		15						10	70.00~250.00			8.00		5≦W≦A−3		
17		17						12				9.00		6≦W≦A−3		
—	—	21		—				16								

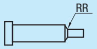
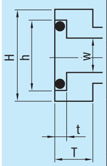
Refer to the drawing for ℓmin. (normally, α=0) X dimension of *D=6: When ℓ≧10, X=F. When ℓ<10, X=L−10.

Alterations

Part Number	—	L	—	F	—	A	—	C(R)	—	W	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
RDCPJS−5DT16	—	220.00	—	F185.00	—	A14.00	—	C0.3	—	W10.0	—	K30−S0.1	—	KC8.0

Alteration details P.381

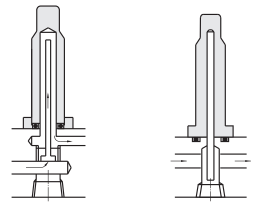
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	Key flat cutting 0.1mm increments	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.1}$	DKC	Three flats cutting D/2≦DKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.1}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC $^{0}_{-0.1}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	HCC=0.1mm increments D+1≦HCC<H−0.3		

Alterations	Code	Spec.	1Code
	RR	Changes R (normally 0.2 or less) to R0.3~0.5 (Improves strength) Designation method RR Available for Step B・C・D D−A≧1.0 Step When D, C≧0.5	Quotation
	ZPC	O-ring groove machining (ORP refer to P.1137) Designation method: Code O-ring(ORP) ZPC 3 H−h≧2 T≧4 No.≧W ⊗ Combination with other than RR not available.	

No.	h	t
3	6	1.4
4	7	
5	8	
6	9	
7	10	
8	11	
9	12	
10	13	
11	15	1.8
12	16	
14	18	

Price Quotation

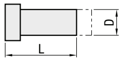
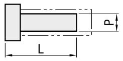
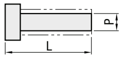
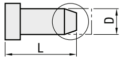
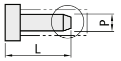
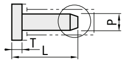
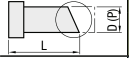
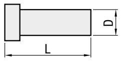
Example


Cooling pipe
Heat transaction pip

Please use cooling pipes or heat exchange pipes so as to increase cooling efficiency for the tip section of center pins.

STRAIGHT CORE PINS

STRAIGHT CORE PINS

Type	Group	Head Thickness (T)	T Shaft diameter (D or P)	T Length (L)	M SKH51 equivalent	M SKD61 equivalent	M NAK80	M DH2F	M STAVAX ESR® (Prehardened steel)	M STAVAX ESR® (Hardening steel)	M PROVA400 (Prehardened steel)	M PROVA400 (Hardening steel)	M SUS440C	M MAS1C	Page
L dimension designation 	Extra Precision	4mm (T4)	$^{0}_{-0.003}$	$^{+0.01}_{0}$	CPM−L	—	—	—	—	—	—	—	—	—	P.397
	Precision		$^{0}_{-0.005}$	$^{+0.01}_{0}$	CPV−L	CPZ−L	—	—	—	—	—	—	—	—	P.397
	Standard		$^{0}_{-0.005}$	$^{+0.02}_{0}$	CPH−L	CPP−L	CPK−L	CPG−L	CPE−L	CPEH−L	CPR−L	CPRH−L	CPW−L	CPY−L	(SKH51 equivalent・SKD61 equivalent) P.397 (STAVAX・PROVA400) P.405 (others) P.403
			$^{-0.01}_{-0.02}$		CPX−L	CPD−L	CPN−L	CPF−L	CPT−L	CPTH−L	CPQ−L	CPQH−L	—	CPA−L	
		6・8mm (JIS)	$^{-0.01}_{-0.02}$		—	CPDJ−L	—	—	—	—	—	—	—	—	P.425
L・P dimension designation 	Extra Precision	4mm (T4)	$^{0}_{-0.003}$	$^{+0.01}_{0}$	CPMB−L	—	—	—	—	—	—	—	—	—	P.399
	Precision		$^{0}_{-0.005}$	$^{+0.01}_{0}$	CPVB−L	CPZB−L	—	—	—	—	—	—	—	—	P.399
	Standard		$^{0}_{-0.005}$	$^{+0.02}_{0}$	CPHB−L	CPPB−L	CPKB−L	CPGB−L	CPEB−L	CPEHB−L	CPRB−L	CPRHB−L	CPWB−L	CPYB−L	(SKH51 equivalent・SKD61 equivalent) P.399 (STAVAX・PROVA400) P.405 (others) P.403
			$^{-0.01}_{-0.02}$		CPXB−L	CPDB−L	CPNB−L	CPFB−L	CPTB−L	CPTHB−L	CPQB−L	CPQHB−L	—	CPAB−L	
		6・8mm (JIS)	$^{-0.01}_{-0.02}$		—	CPDJB−L	—	—	—	—	—	—	—	—	P.425
P designation・L dimension selection 	—	4mm (T4)	$^{0}_{-0.005}$	$^{+5}_{+0.1}$	CPH−G	CPP−G	—	—	—	—	—	—	—	—	P.401
			$^{-0.01}_{-0.02}$		CPX−G	CPD−G	—	—	—	—	—	—	—	—	P.401
Tip process・L dimension designation 	Extra Precision	4mm (T4)	$^{0}_{-0.003}$	$^{0}_{-0.01}$ *	CPML☐	—	—	—	—	—	—	—	—	—	P.423
	Precision		$^{0}_{-0.005}$	$^{0}_{-0.01}$ *	CPVL☐	CPZL☐	—	—	—	—	—	—	—	—	P.421
	Standard		$^{0}_{-0.005}$	$^{0}_{-0.02}$ *	CPHL☐	CPPL☐	CPKL☐	CPGL☐	—	—	—	—	CPWL☐	CPYL☐	P.415
			$^{-0.01}_{-0.02}$		CPXL☐	CPDL☐	CPNL☐	CPFL☐	—	—	—	—	—	CPAL☐	
		6・8mm (JIS)	$^{-0.01}_{-0.02}$		—	CPDJL☐	—	—	—	—	—	—	—	—	P.427
Tip process・P・L dimension designation 	Extra Precision	4mm (T4)	$^{0}_{-0.003}$	$^{0}_{-0.01}$ *	CPMBL☐	—	—	—	—	—	—	—	—	—	P.423
	Precision		$^{0}_{-0.005}$	$^{0}_{-0.01}$ *	CPVBL☐	CPZBL☐	—	—	—	—	—	—	—	—	P.421
	Standard		$^{0}_{-0.005}$	$^{0}_{-0.02}$ *	CPHBL☐	CPPBL☐	CPKBL☐	CPGBL☐	—	—	—	—	CPWBL☐	CPYBL☐	P.417
			$^{-0.01}_{-0.02}$		CPXBL☐	CPDBL☐	CPNBL☐	CPFBL☐	—	—	—	—	—	CPABL☐	
		6・8mm (JIS)	$^{-0.01}_{-0.02}$		—	CPDJBL☐	—	—	—	—	—	—	—	—	P.427
Free designation type 	Standard	—	$^{0}_{-0.005}$	$^{0}_{-0.02}$ *	F−CPH☐	F−CPD☐	F−CPN☐	F−CPF☐	—	—	—	—	—	—	P.429
			$^{-0.01}_{-0.02}$		F−CPHE☐	F−CPDE☐	F−CPNE☐	F−CPFE☐	—	—	—	—	—	—	P.429
Tip process・L dimension designation 	Standard	4mm (T4)	$^{0}_{-0.005}$	$^{+0.05}_{0}$ *	CPH☐☐ CPHB☐☐	CPP☐☐ CPPB☐☐	—	—	—	—	—	—	—	—	P.419
			$^{-0.01}_{-0.02}$		CPX☐☐ CPXB☐☐	CPD☐☐ CPDB☐☐	—	—	—	—	—	—	—	—	P.419
Core Pin Blanks 	—	4mm (T4)	$^{0}_{-0.005}$	$^{+5}_{+0.1}$	CPH	—	—	—	—	—	—	—	—	—	P.437
			$^{-0.01}_{-0.02}$		—	CPD	—	—	—	—	—	—	—	—	P.437

*Tolerance of L dimension varies depending on the shape.

Use these data for reference only as they are dependent on specific heat treatment and usage conditions.

Stainless Steel ***STAVAX ESR***® is registered trademarks of UDDEHOLM TOOL CO. PROVA400 is equivalent to SUS420J2 upgrading steel from Fujikoshi. CO.

Material Characteristics of Straight Core Pins

M		SKH51(M2)(1.3343) High speed tool steel	SKD61 (H13)(1.2344) Thermal die steel	NAK80 Precipitation type Prehardened steel	DH2F SKD61 type Prehardened steel	STAVAX ESR® Prehardened steel	STAVAX ESR® Hardening steel	PROVA400 Prehardened steel	PROVA400 Hardening steel	SUS440C Martensite type Stainless steel	MAS1C Maraging steel
H	HRC	58～60	48～52	37～43	38～42	29～35	50～54	29～35	50～54	56～60	50～54
Machining characteristics	Wear resistance	5	3.5	2	3	3	4	3	4	4	3.5
	Ability to be mirror-finished	4	4	5	3	5	5	5	5	4	5
	Toughness	3	5	1	4	5	5	5	5	3	5
	Corrosion resistance	3	3	3	3	5	5	5	5	5	3
Physical characteristics	Density [g/cm^3]	8.2	7.75	7.8	7.75	7.8	7.8	7.8	7.8	7.78	8.02
	Modulus of longitudinal elasticity [kgf/mm^2]	22300	21000	20500	21000	21900	20400	21900	21900	20400	18600
	Coefficient of thermal expansion [$\times 10^{-6}$/℃]	10.1	10.8	12.5	10.8	11.0	11.0	10.9	10.9	10.2	10.1
	Thermal conductivity [cal/cm・sec・℃]	0.051	0.061	0.1	0.061	0.055	0.055	0.058	0.058	0.058	—
Mechanical characteristics	Tensile strength [kgf/mm^2]	235	135	128	135	115	196	115	200	200	215
	Charpy impact value [kgf・m/cm^2]	2	6	2.2	4	—	—	—	—	1.5	5

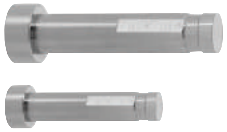
Machining characteristics Poor 1 ←→ 5 Excellent Conversion formula 1kgf/mm^2=9.81N/mm^2 1cal/cm・sec・℃=418.6W/M.K 1kgf・m/cm^2=9.81J/cm^2

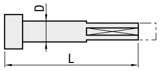
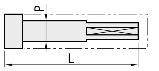
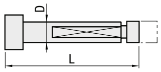
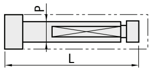
Following material will be discontinued when stocked materials are finished. PROVA400(Prehardened steel), PROVA400(Hardening steel), and MAS1C

GAS RELEASE STRAIGHT CORE PINS

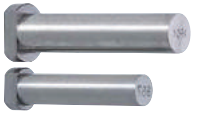
・Cutting facets

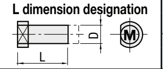
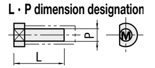
・With gas vent



Type	Group	T Shaft diameter (D or P)	T Length (L)	M SKH51 equivalent	M SKD61 equivalent	M NAK80	M DH2F	Page
L dimension designation 	Precision	$^{0}_{-0.005}$	$^{+0.01}_{0}$	GW☐−CPV−L	—	—	—	P.407
	Standard	$^{0}_{-0.005}$	$^{+0.02}_{0}$	GW☐−CPH−L	—	—	—	
		$^{-0.01}_{-0.02}$		GW☐−CPX−L	—	—	—	
L・P dimension designation 	Precision	$^{0}_{-0.005}$	$^{+0.01}_{0}$	GW☐−CPVB−L	—	—	—	P.407
	Standard	$^{0}_{-0.005}$	$^{+0.02}_{0}$	GW☐−CPHB−L	—	—	—	
		$^{-0.01}_{-0.02}$		GW☐−CPXB−L	—	—	—	
L dimension designation 	Extra Precision	$^{0}_{-0.003}$	$^{+0.01}_{0}$	GV−CPM−L	—	—	—	P.413
	Precision	$^{0}_{-0.005}$	$^{+0.01}_{0}$	GV−CPV−L	GV−CPZ−L	—	—	P.411
	Standard	$^{0}_{-0.005}$	$^{+0.02}_{0}$	GV−CPH−L	GV−CPP−L	GV−CPK−L	GV−CPG−L	P.409
		$^{-0.01}_{-0.02}$		GV−CPX−L	GV−CPD−L	GV−CPN−L	GV−CPF−L	
L・P dimension designation 	Extra Precision	$^{0}_{-0.003}$	$^{+0.01}_{0}$	GV−CPMB−L	—	—	—	P.413
	Precision	$^{0}_{-0.005}$	$^{+0.01}_{0}$	GV−CPVB−L	GV−CPZB−L	—	—	P.411
	Standard	$^{0}_{-0.005}$	$^{+0.02}_{0}$	GV−CPHB−L	GV−CPPB−L	GV−CPKB−L	GV−CPGB−L	P.409
		$^{-0.01}_{-0.02}$		GV−CPXB−L	GV−CPDB−L	GV−CPNB−L	GV−CPFB−L	

STRAIGHT CORE PINS WITH ENGRAVING



Type	T Shaft diameter (D or P)	T Length (L)	M SKH51 equivalent Concave character	Page	Concave character (Sequential No.)	Page	Convex character	Page
L dimension designation 	$^{0}_{-0.005}$	$^{+0.02}_{0}$	CPH☐M	P.431	CPH1MR	P.433	CPH☐T	P.435
	$^{-0.01}_{-0.02}$		CPX☐M		CPX1MR		CPX☐T	
L・P dimension designation 	$^{0}_{-0.005}$		CPHB☐M		CPHB1MR		CPHB☐T	
	$^{-0.01}_{-0.02}$		CPXB☐M		CPXB1MR		CPXB☐T	

Selection Method for Straight Core Pins with Tip Process

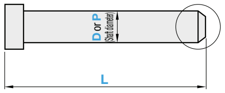
Codes for Core Pins with Tip Process	
Shaft diameter (D) selection type	CP☐ L☐ CPD JL☐ (JIS Head Standard $^{-0.01}_{-0.02}$ SKD61 equivalent only)
Shaft diameter (P) designation type	CP☐ BL☐ CPD JBL☐ (JIS Head Standard $^{-0.01}_{-0.02}$ SKD61 equivalent only)

Material・tolerance codes

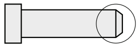
Tip process code

Group		Extra Precision	Precision	Standard	
T	Shaft diameter (D or P)	$^{0}_{-0.003}$	$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{-0.01}_{-0.02}$
	Length (L)*	$^{+0.01}_{0}$	$^{+0.01}_{0}$	$^{+0.02}_{0}$	
M	SKH51 equivalent	M	V	H	X
	SKD61 equivalent	—	Z	P	D
	NAK80	—	—	K	N
	DH2F	—	—	G	F
	SUS440C	—	—	W	—
	MAS1C	—	—	Y	A

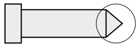
*The tolerance values for L dimension are representative ones. The tolerance range varies depending on the shape selected. For details, refer to the Catalog page for each product.



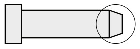
Shape Tip process code P.415～P.430



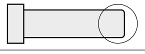
C (C chamfered)



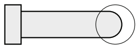
G (Cone)



T (Tapered)

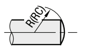


R (R chamfered)

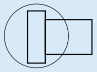
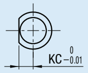
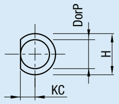
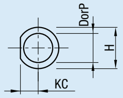
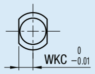
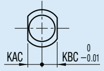
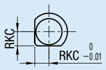
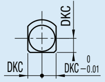
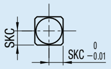
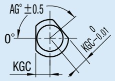
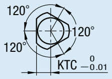
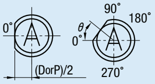
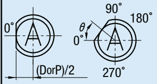
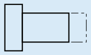
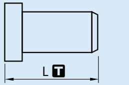


B (Spherical processed)

*The tip shape becomes as shown in the diagram on the right, through R designation for Extra precision/precision and alteration (RC) for standard.

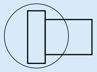
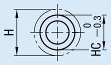
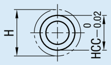
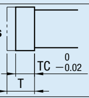
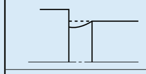
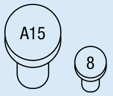
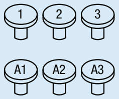
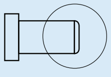
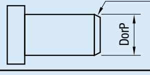
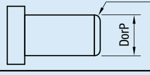
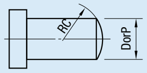
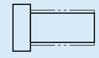
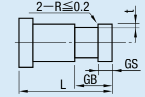


ALTERATION GUIDE FOR STRAIGHT CORE PINS

Items	Applicable Products	Alterations	Codes	Specifications		1Code
 **Head alteration**	**Common**	**Key flat cutting** 	**KC**	Single flat cutting Range of designation (D or P)/2≦KC<H/2 D or P≧0.6	When the key flat size is (shaft diameter/2)  Unit of designation Shaft diameter selection type (D/2) ············0.05mm increments possible Shaft diameter designation (0.01mm increments) type (P/2) ············0.005mm increments possible Shaft diameter designation (0.005mm increments) type (P/2) ············0.0025mm increments possible Shaft diameter designation (0.001mm increments) type (P/2) ············0.0005mm increments possible Designation method • KC2.61 (When P5.22) • WKC3.0875 (When P6.175) • RKC2.7415 (When P5.483) • DKC3 (When D6) • SKC2.5 (When D5) • KGC1.5—AG125 (When D3) • KTC3.085 (When P6.17) To designate an arbitrary flat size  Unit of designation 0.1mm increments Designation method • KC1.4 • WKC2.3 • KAC1.4—KBC1.6 • RKC1.4 • DKC1.75 • SKC5.8 • KGC1.4—G85 • KTC2.3	Quotation
		Key flat cutting 	**WKC**	Two parallel flats cutting Range of designation (D or P)/2≦WKC<H/2 D or P≧0.6		
		Key flat cutting 	**KAC** **KBC**	Varied width parallel flats cutting Range of designation (D or P)/2≦KAC KAC<KBC<H/2 D or P≧0.6		
		Key flat cutting 	**RKC**	Right angled two falts cutting Range of designation (D or P)/2≦RKC<H/2 D or P≧0.6		
		Key flat cutting 	**DKC**	Three flats cutting Range of designation (D or P)/2≦DKC<H/2 D or P≧0.6		
		Key flat cutting 	**SKC**	Four flats cutting Range of designation (D or P)/2≦SKC<H/2 D or P≧0.6		
		Key flat cutting (angled) 	**KGC**	Adds a flat at the reference plane (0˚), and another at the designated angle from there. Range of designation (D or P)/2≦KGC<H/2 D or P≧0.6 AG=1˚ increments 0<AG<360		
		Key flat cutting (angled) 	**KTC**	Three flats cutting at 120˚ Range of designation (D or P)/2≦KTC<H/2, D or P≧0.6		
	Straight Core Pins with engraving Refer to page **P.431**	**Key flat cutting (angled)** 	**AKC**	Changes the flat position (standard: 0˚) clockwise in 1˚ increments. Range of designation 0<AKC<360 Unit of designation 1˚ increments Designation method θ=45˚ ···› AKC45 No need to designate AKC0		
		Key flat cutting (angled) 	**AWC**	Adds two flats at the standard (0˚) position, or at the designated angle (clockwise in 1˚ increments from the standard position). Range of designation 0≦AWC<360 Unit of designation 1˚ increments Designation method θ=0˚ ···› AWC0, θ=60˚ ···› AWC60		
 **Allover length alteration**	Extra Precision **Core Pins**	**L dimension tolerance alteration** 	**LKC**	L dimension tolerance $^{+0.01}_{0}$ can be changed to $^{+0.005}_{0}$. Unit of designation L designation in 0.005mm increments possible Available when 1.5≦(D or P)≦5 Designation method LKC Straight Core Pins with Tip Process ··· Available when Shape C • T • R		

Note that designating H/2—0.15 or more for key flat cutting alteration will create hardly any flat on the head.

Non JIS material definition is listed on P.1351 - 1352

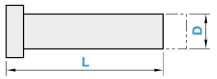
Items	Applicable Products	Alterations	Codes	Specifications	1Code
 **Head alteration**	**Common**	**Head diameter change** 	**HC**	Reduces the head diameter. Range of designation D or P≦HC<H, D or P≧0.3 Unit of designation 0.1mm increments Designation method HC6.5 In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
		Head diameter change (precision) 	**HCC**	Reduces the head diameter. (precision) Range of designation (D or P)+0.5≦HCC<H—0.3 D or P≧0.6 Unit of designation 0.1mm increments Designation method HCC6.1 D or P≧0.6	
		Head thickness change 	**TC**	Reduces the head thickness. Range of designation Right table Unit of designation 0.1mm increments Designation method TC3.5 D or P: less than 0.8 — TC: 2.0≦TC<4.0 D or P: 0.8 or more — TC: 1.5≦TC<4.0 (head thickness JIS T/2≦TC<T) Dimensions L and F remain unchanged.	
		Relief under the head 	**TRN**	Adds a relief under the head, making plate chamfering unnecessary. D or P≧0.6 Designation method TRN D or P≧0.6	
		Numbering on the head 	**NHC**	Numbering on the head Electrolytic marking of ID code on the head(in 5 point, Round Gothic type). Available characters Numerals: 0～9; Alphabets: A～Z Range of designation 1 character when 2≦H≦4.9 1 or 2 characters when 5≦H≦6.9 (Only the first character may be an alphabet.) Up to 3 characters when 7≦H (Only the first character may be an alphabet.) Number-marking may not be possible depending on the specified characters when the space indicated in the table below cannot be retained. Unit: mm 1 character: Character Height 2.3, Character Width 2.7 2 characters: Character Height 2.3, Character Width 5.0 3 characters: Character Height 2.3, Character Width 7.3 Designation method NHC—6, NHC—23, NHC—A90 ⊗ Combination with SKC not available. Available when head diameter H≧2 ⊗ NHC is not available when numbering space in head exceeds the maximum of 1.8 long x 1.8 wide x characters.	
		Numbering on the head 	**NHN**	Automatic sequential numbering on the head Adds a sequential number on the head of each core pin when two or more pieces of identical size are ordered. Available characters Same as NHC (see above) Range of designation Same as NHC (see above) Designation method When 3 pieces are ordered with NHN-1, a sequential number starting from 1 is added on the head of each piece. When 10 pieces are ordered with NHN-A15: A sequential number starting from A15 (through A24) is added on the head of each piece. Only available when two or more pieces of an identical size are ordered. Available when head diameter H≧2 ⊗ Combination with SKC not available. ⊗ NHC is not available when numbering space in head exceeds the maximum of 1.8 long x 1.8 wide x characters.	
 **Tip shape alteration**	**Core Pins with tip process** Shape **C**	**C chamfering alteration** C T 	**CKC**	The tip C chamfering tolerance ±0.05 can be changed to ±0.02. Range of designation 0.1<CKC≦{(D or P)—0.2}/2, L—CKC≧9.5 Unit of designation 0.05mm increments Designation method CKC0.95 Available for Standard type	
	Core Pins with tip process Shape **R**	**R chamfering alteration** R T 	**RTC**	The tip R chamfering tolerance ±0.1 can be changed to ±0.05. Range of designation 0.2<RTC≦{(D or P)—0.2}/2, L—RTC≧10 Unit of designation 0.1mm increments Designation method RTC0.6 Available for Standard type	
	Core Pins with tip process Shape **B**	**SR extension** 	**RC**	Allows designation of the radius of spherical shape processing (SR) at a value larger than a half of the shaft diameter. Range of designation (D or P)/2<4 ······ (D or P)/2≦RC≦1.5×(D or P) (D or P)/2≧4 ······ (D or P)/2≦RC≦3 ×(D or P) and RC≦32 Unit of designation 0.1mm increments Designation method RC0.6 Available for Standard type	
 **Shaft alteration**	**Common**	**Gas vent machining** 	**GVC**	Gas vent machining Available when D or P≧2 Range of designation 2+ℓ≦GS≦10, GS+2≦GB≦30 Unit of designation 1mm increments Designation method GVC—GS3—GB20 D or P: 2.00～ 4.99 — t: 0.1 D or P: 5.00～ 9.99 — t: 0.2 D or P: 10.00～20.00 — t: 0.3 L—GB≧10 ℓ varies depending on the shape. Refer to the catalog page of each product.	

When you change the engraving depth of straight core pins with engraving, refer to **EC** code on **P.434.**

Dies Steel
SKD61 equivalent
High Speed Steel
SKH51 equivalent

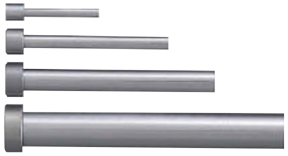
STRAIGHT CORE PINS

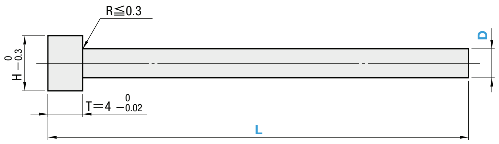
—SHAFT DIAMETER (D) SELECTION • L DIMENSION DESIGNATION TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS





Type	M	H	Group	T D	T L
CPD—L	SKD61 equivalent	48~52HRC	Standard	−0.01 −0.02	+0.02 0
CPX—L	SKH51 equivalent	58~60HRC			
CPP—L	SKD61 equivalent	48~52HRC		0 −0.005	
CPH—L	SKH51 equivalent	58~60HRC			
CPZ—L	SKD61 equivalent	48~52HRC	Precision	0 −0.005	+0.01 0
CPV—L	SKH51 equivalent	58~60HRC			
CPM—L	SKH51 equivalent	58~60HRC	Extra Precision	0 −0.003	+0.01 0

■ Standard Precision Type

H	Part Number Type	D	L 0.01mm increments
2	CPX—L CPH—L CPV—L	0.3	7.00~ 60.00
		0.4	
		0.5	
3	CPD—L CPX—L CPP—L CPH—L CPZ—L CPV—L	0.6	7.00~100.00
		0.7	
		0.8	
		0.9	
		1	
		1.1	
		1.2	
		1.3	
		1.4	
		1.5	
4		1.6	
		1.7	
		1.8	
		1.9	
		2	
5		2.5	
6		3	
7		3.5	7.00~120.00
		4	
8		4.5	
		5	7.00~120.00 CPH—L, CPV—L only 7.00~150.00
9		5.5	
		6	
10		6.5	8.00~120.00 CPH—L, CPV—L only 8.00~150.00
		7	
11		8	
15		10	
18		13	
21		16	
25		20	

■ Extra Precision Type

H	Part Number Type	D	L 0.01mm increments
2	CPM—L	0.5	7.00~ 60.00
3		0.6	7.00~100.00
		0.7	
		0.8	
		0.9	
		1	
		1.1	
		1.2	
		1.3	
		1.4	
		1.5	
4		1.6	
		1.7	
		1.8	
		1.9	
		2	
5		2.5	
6		3	
7		3.5	
		4	
8		4.5	
		5	
9		5.5	
		6	
10		6.5	8.00~100.00
		7	
11		8	
15		10	
18		13	

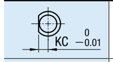
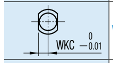
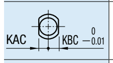
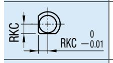
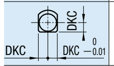
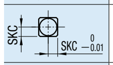
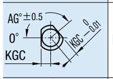
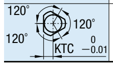
Order Part Number — L
CPD—L1.6 — 72.35

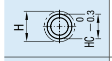
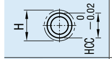
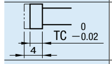
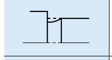
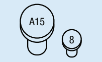
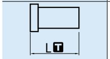
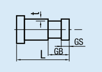
Days to Ship Quotation

Price Quotation

Alterations Part Number — L — (KC・WKC···etc.)
CPD—L1.6 — 72.35 — HC3.0
CPM—L3 — 8.00 — TC2.0

Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2 D≧0.6	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2 D≧0.6		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only D≧0.6 KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2 D≧0.6		
	DKC	Three flats cutting D/2≦DKC<H/2 D≧0.6		
	SKC	Four flats cutting D/2≦SKC<H/2 D≧0.6		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 D≧0.6 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2 D≧0.6		

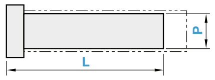
Alterations	Code	Spec.	1Code
	HC	Head diameter change D≧0.3 HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3, D≧0.6	
	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L D: 0.3≦D<0.8 — TC: 2.0≦TC<4.0 D: 0.8≦D≦20 — TC: 1.5≦TC<4.0	
	TRN	Relief under the head (No need for plate chamfering) D≧0.6	
	NHC	Numbering on the head How to order P.396 Available when H≧2 Combination with SKC not available.	
	LKC	L dimension tolerance alteration L $^{+0.01}_{0}$ → $^{+0.005}_{0}$ (L designation in 0.005mm increments possible) Available when 1.5≦D≦5 Available when CPM—L	
	GVC	Gas vent machining GS・GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 Available when D≧2 L−GB≧10 How to order P.396	

Similar products with GVC alteration "Gas release core pins" P.407~410

Dies Steel
SKD61 equivalent
High Speed Steel
SKH51 equivalent

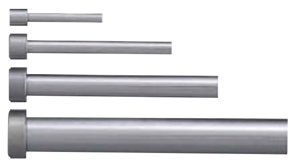
STRAIGHT CORE PINS

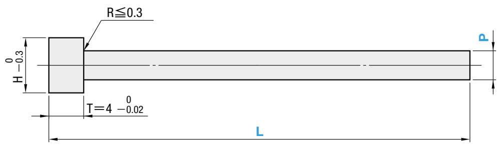
—SHAFT DIAMETER (P) DESIGNATION • L DIMENSION DESIGNATION TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS





Type	M	H	Group	T P	T L
CPDB—L	SKD61 equivalent	48～52HRC	Standard	−0.01 −0.02	+0.02 0
CPXB—L	SKH51 equivalent	58～60HRC			
CPPB—L	SKD61 equivalent	48～52HRC		0 −0.005	
CPHB—L	SKH51 equivalent	58～60HRC			
CPZB—L	SKD61 equivalent	48～52HRC	Precision	0 −0.005	+0.01 0
CPVB—L	SKH51 equivalent	58～60HRC			
CPMB—L	SKH51 equivalent	58～60HRC	Extra Precision	0 −0.003	+0.01 0

■ Standard Precision Type

H	Part Number Type	Part Number No.	L 0.01mm increments	P Standard 0.01mm increments	P Precision 0.005mm increments
2	CPXB—L CPHB—L CPVB—L	0.5	7.00～ 60.00	0.30～ 0.49	0.300～ 0.495
3		0.6	7.00～100.00	0.50～ 0.59	0.500～ 0.595
	CPDB—L CPXB—L CPPB—L CPHB—L CPZB—L CPVB—L	1		0.60～ 0.99	0.600～ 0.995
		1.5		1.00～ 1.49	1.000～ 1.495
4		2		1.50～ 1.99	1.500～ 1.995
5		2.5		2.00～ 2.49	2.000～ 2.495
6		3		2.50～ 2.99	2.500～ 2.995
7		3.5	7.00～120.00	3.00～ 3.49	3.000～ 3.495
		4		3.50～ 3.99	3.500～ 3.995
8		4.5		4.00～ 4.49	4.000～ 4.495
		5	7.00～120.00	4.50～ 4.99	4.500～ 4.995
9		5.5	CPHB—L CPVB—L only 7.00～150.00	5.00～ 5.49	5.000～ 5.495
		6		5.50～ 5.99	5.500～ 5.995
10		6.5	8.00～120.00	6.00～ 6.49	6.000～ 6.495
		7		6.50～ 6.99	6.500～ 6.995
11		8		7.00～ 7.99	7.000～ 7.995
15		10	CPHB—L CPVB—L only 8.00～150.00	8.00～ 9.99	8.000～ 9.995
18		13		10.00～12.99	10.000～12.995
21		16		13.00～15.99	13.000～15.995
25		20		16.00～19.99	16.000～19.995

■ Extra Precision Type

H	Part Number Type	Part Number No.	L 0.01mm increments	P 0.001mm increments
2	CPMB—L	0.5	7.00～ 60.00	0.300～ 0.499
3		0.6	7.00～100.00	0.500～ 0.599
		1		0.600～ 0.999
		1.5		1.000～ 1.499
4		2		1.500～ 1.999
5		2.5		2.000～ 2.499
6		3		2.500～ 2.999
7		3.5		3.000～ 3.499
		4		3.500～ 3.999
8		4.5		4.000～ 4.499
		5		4.500～ 4.999
9		5.5		5.000～ 5.499
		6		5.500～ 5.999
10		6.5	8.00～100.00	6.000～ 6.499
		7		6.500～ 6.999
11		8		7.000～ 7.999
15		10		8.000～ 9.999
18		13		10.000～12.999

Order

Part Number	—	L	—	P
CPPB—L3	—	35.72	—	P2.77

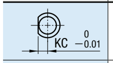
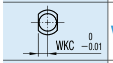
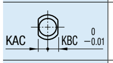
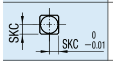
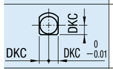
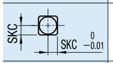
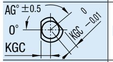
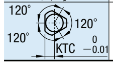
Days to Ship Quotation

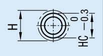
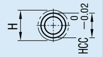
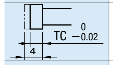
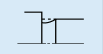
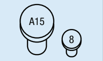
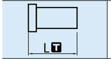
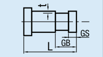
Price Quotation

Alterations

Part Number	—	L	—	P	—	(KC・WKC···etc.)
CPPB—L3	—	35.72	—	P2.70	—	KC1.5
CPMB—L3	—	8.00	—	P2.990	—	TC3.0

Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC＜H/2 P≧0.6	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible Precision 0.0025mm increments possible Extra precision type 0.0005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting P/2≦WKC＜H/2 P≧0.6		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only P≧0.6 KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2 P≧0.6		Quotation
	DKC	Three flats cutting P/2≦DKC＜H/2 P≧0.6		
	SKC	Four flats cutting P/2≦SKC＜H/2 P≧0.6		
	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 P≧0.6 0＜AG＜360 AG=1° increments		
	KTC	Three flats cutting at 120° P/2≦KTC＜H/2, P≧0.6		

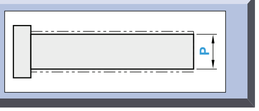
Alterations	Code	Spec.	1Code
	HC	Head diameter change P≦HC＜H HC=0.1mm increments P≧0.3 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC＜H−0.3, P≧0.6	
	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L P: 0.30≦P＜0.80 — TC: 2.0≦TC＜4.0 P: 0.80≦P≦19.995 — TC: 1.5≦TC＜4.0	Quotation
	TRN	Relief under the head (No need for plate chamfering) Available when P≧0.6	
	NHC	Numbering on the head How to order P.396 Available when H≧2 Combination with SKC not available.	
	LKC	L dimension tolerance alteration L $^{+0.01}_{0}$ ···› $^{+0.005}_{0}$ (L designation in 0.005mm increments possible) Available when 1.5≦P≦5 Available when CPMB—L	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2 2≦GS≦10 GS+2≦GB≦30 L−GB≧10 How to order P.396	

Similar products with GVC alteration "Gas release core pins" P.407～410

Dies Steel
SKD61 equivalent
High Speed Steel
SKH51 equivalent

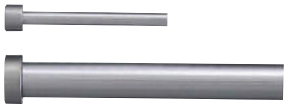
STRAIGHT CORE PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) • L DIMENSION SELECTION TYPE—

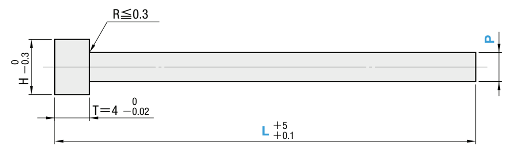


Non JIS material definition is listed on P.1351 - 1352

RoHS



Type	M	H	T P
CPD—G	SKD61 equivalent	48～52HRC	−0.01 −0.02
CPX—G	SKH51 equivalent	58～60HRC	
CPP—G	SKD61 equivalent	48～52HRC	0 −0.005
CPH—G	SKH51 equivalent	58～60HRC	



H	Part Number Type	Part Number No.	L	P 0.01mm increments
2	CPX—G	0.5	60	0.30～ 0.49
3	CPH—G	0.6		0.50～ 0.59
	CPD—G CPX—G CPP—G CPH—G	1	60 100	0.60～ 0.99
		1.5		1.00～ 1.49
4		2		1.50～ 1.99
5		2.5		2.00～ 2.49
6		3		2.50～ 2.99
7		3.5		3.00～ 3.49
		4		3.50～ 3.99
8		4.5		4.00～ 4.49
		5		4.50～ 4.99
9		5.5		5.00～ 5.49
		6		5.50～ 5.99
10		6.5		6.00～ 6.49
		7		6.50～ 6.99
11		8		7.00～ 7.99
15		10		8.00～ 9.99
18		13		10.00～12.99
21		16		13.00～15.99
25		20		16.00～19.99

Order

Part Number	—	L	—	P
CPD—G3	—	60	—	P2.77

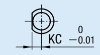
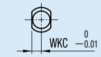
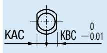
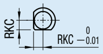
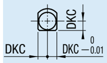
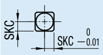
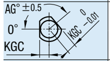
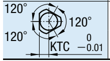
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	P	—	(KC・WKC···etc.)
CPD—G3	—	60	—	P2.70	—	KC1.5

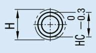
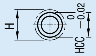
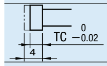
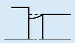
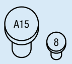
Alteration details ☞ P.395

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC＜H/2 P≧0.6	Quotation
	WKC	Two flats cutting P/2≦WKC＜H/2 P≧0.6	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only P≧0.6 KAC＜KBC＜H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2 P≧0.6	
	DKC	Three flats cutting P/2≦DKC＜H/2 P≧0.6	
	SKC	Four flats cutting P/2≦SKC＜H/2 P≧0.6	
	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 P≧0.6, 0＜AG＜360 AG=1° increments	
	KTC	Three flats cutting at 120° P/2≦KTC＜H/2, P≧0.6	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.005mm increments possible

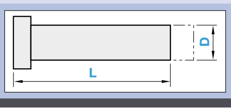
(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

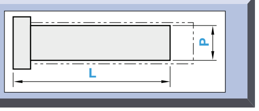
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P≦HC＜H, P≧0.3 In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC＜H−0.3, P≧0.6	Quotation
	TC	Head thickness change TC=0.1mm increments (Dimension L becomes shorter by 4−TC) 4−TC≦Lmax.−L P: 0.30≦P＜0.80 — TC: 2.0≦TC＜4.0 P: 0.80≦P≦19.99 — TC: 1.5≦TC＜4.0	
	TRN	Relief under the head (No need for plate chamfering) Available when P≧0.6	
	NHC	Numbering on the head How to order ☞ P.396 Available when H≧2 ⊗ Combination with SKC not available.	

NAK80 DH2F
SUS440C
MAS1C

STRAIGHT CORE PINS

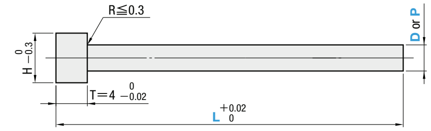
—SHAFT DIAMETER (D) SELECTION / SHAFT DIAMETER (P) DESIGNATION • L DIMENSION DESIGNATION • SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ / $^{0}_{-0.005}$ TYPE—





Non JIS material definition is listed on P.1351 - 1352

RoHS

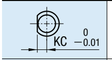
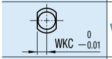
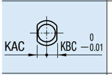
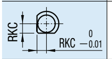
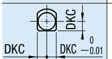
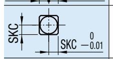
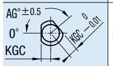
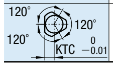


Type		M	H	T	
Shaft diameter (D) selection	Shaft diameter (P) designation			D or P	L
CPN—L	CPNB—L	NAK80	37～43HRC	−0.01 −0.02	+0.02 0
CPF—L	CPFB—L	DH2F	38～42HRC		
CPA—L	CPAB—L	MAS1C	50～54HRC		
CPK—L	CPKB—L	NAK80	37～43HRC	0 −0.005	
CPG—L	CPGB—L	DH2F	38～42HRC		
CPY—L	CPYB—L	MAS1C	50～54HRC		
CPW—L	CPWB—L	SUS440C	56～60HRC		

MAS1C will be discontinued when stocked materials are finished.

■Shaft diameter (D) selection type

H	Part Number Type	D	L 0.01mm increments
3	CPW—L	0.6	7.00～100.00
		0.7	
	CPN—L CPF—L CPA—L (D≦4) CPK—L CPG—L CPY—L (D≦4) CPW—L	0.8	
		0.9	
		1	
		1.1	
		1.2	
		1.3	
		1.4	
		1.5	
4		1.6	
		1.7	
		1.8	
		1.9	
		2	
5		2.5	
6		3	
7		3.5	7.00～120.00
		4	
8		4.5	
		5	
9		5.5	
		6	
10		6.5	8.00～120.00
		7	
11		8	
15		10	
18		13	
21		16	

Alterations	Code	Spec.		1Code
 KC $^{0}_{-0.01}$	KC	Single flat cutting (D or P)/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC $^{0}_{-0.01}$	WKC	Two flats cutting (D or P)/2≦WKC＜H/2		
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting (D or P)/2≦RKC＜H/2		
 DKC DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting (D or P)/2≦DKC＜H/2		
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting (D or P)/2≦SKC＜H/2		
 AG°±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting (D or P)/2≦KGC＜H/2 0＜AG＜360 AG=1° increments		
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° (D or P)/2≦KTC＜H/2		

■Shaft diameter (P) designation type

H	Part Number Type	No.	L 0.01mm increments	P 0.01mm increments
3	CPWB—L	1	7.00～100.00	0.60～ 0.79
	CPNB—L CPFB—L CPAB—L (P≦3.99) CPKB—L CPGB—L CPYB—L (P≦3.99) CPWB—L			0.80～ 0.99
		1.5		1.00～ 1.49
4		2		1.50～ 1.99
5		2.5		2.00～ 2.49
6		3		2.50～ 2.99
7		3.5	7.00～120.00	3.00～ 3.49
		4		3.50～ 3.99
8		4.5		4.00～ 4.49
		5		4.50～ 4.99
9		5.5		5.00～ 5.49
		6		5.50～ 5.99
10		6.5	8.00～120.00	6.00～ 6.49
		7		6.50～ 6.99
11		8		7.00～ 7.99
15		10		8.00～ 9.99
18		13		10.00～12.99
21		16		13.00～15.99

Order

· Shaft diameter (D) selection type: Part Number — L
CPW—L1.6 — 72.35

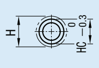
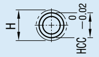
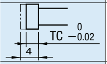
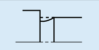
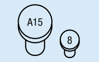
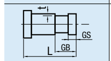
· Shaft diameter (P) designation type: Part Number — L — P
CPKB—L3 — 35.72 — P2.77

Days to Ship Quotation

Alterations

Part Number — L — P — (KC・WKC…etc.)
CPG —L1.6 — 72.35 — HC 3.0
CPKB—L3 — 35.72 — P2.77 — TC 2.0

Alteration details P.395

Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H CPY—L/CPYB—L:(D or P)+0.5≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC $^{0}_{-0.02}$	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H−0.3	
 TC $^{0}_{-0.02}$ 4	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L D or P: 0.6≦D or P＜0.8 — TC: 2.0≦TC＜4.0 D or P: 0.8≦D or P≦16 — TC: 1.5≦TC＜4.0	Quotation
	TRN	Relief under the head (No need for plate chamfering)	
 A15 8	NHC	Numbering on the head How to order P.396 Available when H≧2 Combination with SKC not available.	
 GS L GB	GVC	Gas vent machining GS・GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 Available when D or P≧2 L−GB≧10 How to order P.396	

Similar products with GVC alteration "Gas release core pins" P.409

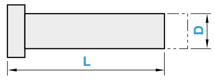
Price Quotation

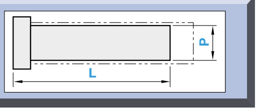
PROVA400

STAVAX ESR®

STRAIGHT CORE PINS

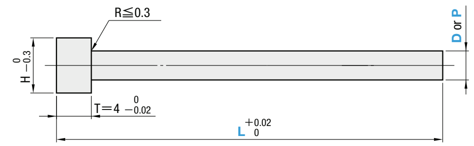
—SHAFT DIAMETER (D) SELECTION／SHAFT DIAMETER (P) DESIGNATION • L DIMENSION DESIGNATION • SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$／$^{0}_{-0.005}$ TYPE—





Non JIS material definition is listed on P.1351 - 1352

RoHS



Type		M	H	T	
Shaft diameter (D) selection	Shaft diameter (P) designation			D or P	L
CPT—L	CPTB—L	STAVAX ESR® Prehardened steel	29～35HRC	$^{-0.01}_{-0.02}$	$^{+0.02}_{0}$
CPTH—L	CPTHB—L	STAVAX ESR® Hardening Steel	50～54HRC		
CPQ—L	CPQB—L	PROVA400 Prehardened steel	29～35HRC		
CPQH—L	CPQHB—L	PROVA400 Hardening Steel	50～54HRC		
CPE—L	CPEB—L	STAVAX ESR® Prehardened steel	29～35HRC	$^{0}_{-0.005}$	
CPEH—L	CPEHB—L	STAVAX ESR® Hardening Steel	50～54HRC		
CPR—L	CPRB—L	PROVA400 Prehardened steel	29～35HRC		
CPRH—L	CPRHB—L	PROVA400 Hardening Steel	50～54HRC		

PROVA400(prehardened steel) and PROVA400(hardening steel) will be discontinued when stocked materials are finished.

Order

• Shaft diameter (D) selection type: Part Number — L
CPT—L5 — 72.35

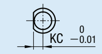
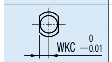
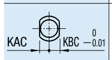
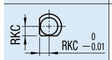
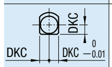
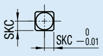
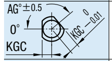
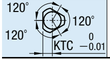
• Shaft diameter (P) designation type: Part Number — L — P
CPTB—L4 — 52.50 — P3.75

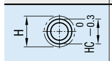
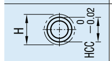
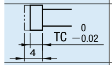
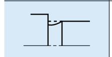
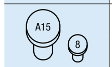
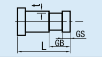
Days to Ship Quotation

Price Quotation

Alterations Part Number — L — P — (KC • WKC⋯etc.)
CPT—L5 — 72.35 — HC 3.0
CPTB—L4 — 52.50 — P3.75 — TC 2.0

Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting (D or P)/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC＜H/2		Quotation
	DKC	Three flats cutting (D or P)/2≦DKC＜H/2		
	SKC	Four flats cutting (D or P)/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting (D or P)/2≦KGC＜H/2 0＜AG＜360 AG=1° increments		
	KTC	Three flats cutting at 120° (D or P)/2≦KTC＜H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H−0.3	
	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L D or P: 0.8≦D or P≦16 / TC: 1.5≦TC＜4.0	Quotation
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 Available when H≧2 Combination with SKC not available.	
	GVC	Gas vent machining GS • GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 Available when D or P≧2 L−GB≧10 How to order P.396	

Similar products with GVC alteration "Gas release core pins" P.409

■Characteristics of PROVA400

- Good in corrosion resistance due to marten site stainless steel material.
- Good for mirror finish due to high cleanliness steel with ultimate reduced non steel inclusion.
- Good in abrasion resistance due to heat treated hardness as 53HRC.
- Extremely less in dimensional changes during heat treatment process due to homogenized processing.

■Shaft diameter (D) selection type

H	Part Number		L 0.01mm increments	U/Price 1～4															
	Type	D		CPT—L (STAVAX ESR® Prehardened steel)		CPTH—L (STAVAX ESR® Hardening Steel)		CPQ—L (PROVA400 Prehardened steel)		CPQH—L (PROVA400 Hardening Steel)		CPE—L (STAVAX ESR® Prehardened steel)		CPEH—L (STAVAX ESR® Hardening Steel)		CPR—L (PROVA400 Prehardened steel)		CPRH—L (PROVA400 Hardening Steel)	
				L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00
3	PROVA400 CPQ—L CPQH—L CPR—L CPRH—L	0.8	7.00～ 60.00																
		0.9																	
		1	7.00～100.00																
		1.1																	
		1.2																	
		1.3																	
		1.4																	
		1.5																	
4		1.6	7.00～120.00																
		1.7																	
		1.8																	
		1.9																	
		2																	
5		2.5																	
6	PROVA400 CPQ—L CPQH—L CPR—L CPRH—L	3	7.00～120.00																
7		3.5																	
		4																	
8		4.5																	
		5																	
9		5.5																	
		6																	
10	STAVAX CPT—L CPTH—L CPE—L CPEH—L	6.5	8.00～120.00																
		7																	
11		8																	
15		10																	
18		13																	
21		16																	

Quotation

■Shaft diameter (P) designation type

H	Part Number		L 0.01mm increments	P 0.01mm increments	U/Price 1～4															
	Type	No.			CPTB—L (STAVAX ESR® Prehardened steel)		CPTHB—L (STAVAX ESR® Hardening Steel)		CPQB—L (PROVA400 Prehardened steel)		CPQHB—L (PROVA400 Hardening Steel)		CPEB—L (STAVAX ESR® Prehardened steel)		CPEHB—L (STAVAX ESR® Hardening Steel)		CPRB—L (PROVA400 Prehardened steel)		CPRHB—L (PROVA400 Hardening Steel)	
					L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00	L 7.00～100.00	L 100.01～120.00
3	PROVA400 CPQB—L CPQHB—L CPRB—L CPRHB—L	1	7.00～ 60.00	0.80～ 0.99																
		1.5	7.00～100.00	1.00～ 1.49																
4		2		1.50～ 1.99																
5		2.5	7.00～120.00	2.00～ 2.49																
6		3		2.50～ 2.99																
7	PROVA400 CPQB—L CPQHB—L CPRB—L CPRHB—L	3.5	7.00～120.00	3.00～ 3.49																
		4		3.50～ 3.99																
8		4.5		4.00～ 4.49																
		5		4.50～ 4.99																
9		5.5		5.00～ 5.49																
		6		5.50～ 5.99																
10	STAVAX CPTB—L CPTHB—L CPEB—L CPEHB—L	6.5	8.00～120.00	6.00～ 6.49																
		7		6.50～ 6.99																
11		8		7.00～ 7.99																
15		10		8.00～ 9.99																
18		13		10.00～12.99																
21		16		13.00～15.99																

Quotation

Refer to P.521 for the size larger than 16 ϕ of the material STAVAX ESR®.

STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.

PROVA400 is equivalent to SUS420J2 upgrading steel from Fujikoshi CO.

High Speed Steel
SKH51 equivalent

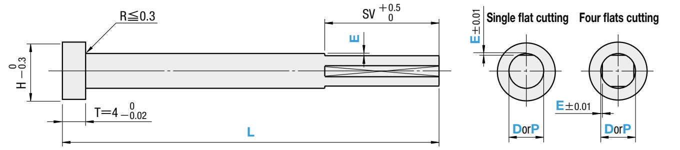
GAS RELEASE STRAIGHT CORE PINS WITH CUTTING FACETS

—SHAFT DIAMETER (D) SELECTION ／ (P) DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type Shaft diameter (D) selection	Type Shaft diameter (P) designation	M H	Group	T D or P	T L
GW—CPX—L GWS—CPX—L	GW—CPXB—L GWS—CPXB—L	SKH51 equivalent 58～60HRC	Standard	−0.01 −0.02	+0.02 0
GW—CPH—L GWS—CPH—L	GW—CPHB—L GWS—CPHB—L			0 −0.005	
GW—CPV—L GWS—CPV—L	GW—CPVB—L GWS—CPVB—L		Precision	0 −0.005	+0.01 0



Limit of E±0.01 is within 10mm from the tip.

■Shaft diameter (D) selection type

H	Part Number Type	Part Number D	L 0.01mm increments	E 0.01mm increments	SV
2	Single flat cutting GW—CPX—L GW—CPH—L GW—CPV—L Four flats cutting (D≧1) GWS—CPX—L GWS—CPH—L GWS—CPV—L	0.5	15.00～60.00	0.02～0.05	L: 15.00～ 50.00, SV: L−10 L: 50.01～ 80.00, SV: 40 L: 80.01～120.00, SV: 50
3		0.6	15.00～100.00		
		0.7			
		0.8			
		0.9			
		1			
		1.2			
		1.5			
4		2			
5		2.5			
6		3			
7		3.5	15.00～120.00		
		4			
8		4.5			
		5			
9		6			
10		7			
11		8			
15		10			
18		13			

■Shaft diameter (P) designation type

H	Part Number Type	Part Number No.	L 0.01mm increments	P Standard 0.01mm increments	P Precision 0.005mm increments	E 0.01mm increments	SV
3	Single flat cutting GW—CPXB—L GW—CPHB—L GW—CPVB—L Four flats cutting (P≧1.000) GWS—CPXB—L GWS—CPHB—L GWS—CPVB—L	0.6	15.00～100.00	0.50～ 0.59	0.500～ 0.595	0.02～0.05	L: 15.00～ 50.00, SV: L−10 L: 50.01～ 80.00, SV: 40 L: 80.01～120.00, SV: 50
		1		0.60～ 0.99	0.600～ 0.995		
		1.5		1.00～ 1.49	1.000～ 1.495		
4		2		1.50～ 1.99	1.500～ 1.995		
5		2.5		2.00～ 2.49	2.000～ 2.495		
6		3		2.50～ 2.99	2.500～ 2.995		
7		3.5	15.00～120.00	3.00～ 3.49	3.000～ 3.495		
		4		3.50～ 3.99	3.500～ 3.995		
8		4.5		4.00～ 4.49	4.000～ 4.495		
		5		4.50～ 4.99	4.500～ 4.995		
9		6		5.00～ 5.99	5.000～ 5.995		
10		7		6.00～ 6.99	6.000～ 6.995		
11		8		7.00～ 7.99	7.000～ 7.995		
15		10		8.00～ 9.99	8.000～ 9.995		
18		13		10.00～12.99	10.000～12.995		

Order

Part Number	—	L	—	P	—	E
GW—CPV—L3	—	18.36			—	E0.02
GW—CPVB—L1	—	20.05	—	P0.995	—	E0.02

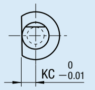
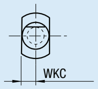
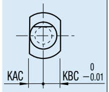
Days to Ship Quotation

Price Quotation

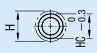
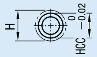
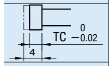
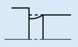
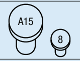
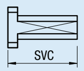
Alterations

Part Number	—	L	—	P	—	E	—	(KC · WKC···etc.)
GW—CPV—L3	—	18.36			—	E0.02	—	WKC1.5
GW—CPVB—L1	—	20.05	—	P0.995	—	E0.02	—	TRN

Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC＜H/2 (D or P)≧0.6	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation Standard: 0.005mm increments possible Precision: 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm Flat cutting is set at a face of cutting facet.	Quotation
	WKC	Two flats cutting (D or P)/2≦WKC＜H/2 (D or P)≧0.6		
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only (D or P)≧0.6 KAC＜KBC＜H/2		

Flat cutting position is set at 90° of cutting facet in counterclockwise direction.

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H−0.3, (D or P)≧0.6	
	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L D or P: 0.5≦D or P＜0.8, TC: 2.0≦TC＜4.0 D or P: 0.8≦D or P≦13, TC: 1.5≦TC＜4.0	
	TRN	Relief under the head (No need for plate chamfering) (D or P)≧0.6	
	NHC	Numbering on the head How to order P.396 Available when H≧2	
	SVC	Extend the flat section SV to the bottom. SVC is only available for single face cutting in the upper position of four flats cutting. (D or P)＜1 ··· L=Applicable until 60 When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

■ Characteristics

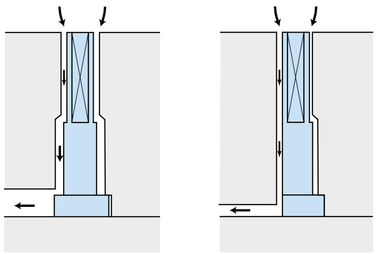
For the molds using the resin which generates gas easily, this core pin performs good effect of gas release from inside cavity through the clearance.

Example

Assemble at the surface of product to release gas.

Gas is released from the clearance. (Example of four flats cutting)

※ ⟶ Gas flow



＜AlterationSVC＞

Please use SVC alteration when processing plate by wire cutting.

NAK80	DH2F
SKD61 equivalent	SKH51 equivalent

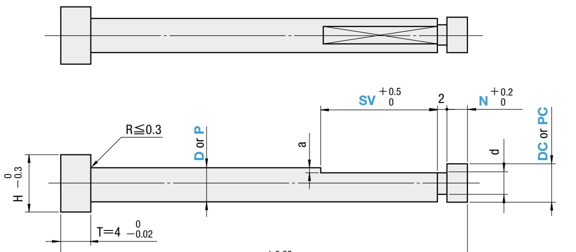
GAS RELEASE STRAIGHT CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—

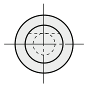
Non JIS material definition is listed on P.1351 - 1352

RoHS

Type		M	H	T
Shaft diameter (D) selection	Shaft diameter (P) designation			D・DC・P・PC
GV−CPN−L	GV−CPNB−L	NAK80	37～43HRC	−0.01 −0.02
GV−CPF−L	GV−CPFB−L	DH2F	38～42HRC	
GV−CPD−L	GV−CPDB−L	SKD61 equivalent	48～52HRC	
GV−CPX−L	GV−CPXB−L	SKH51 equivalent	58～60HRC	
GV−CPK−L	GV−CPKB−L	NAK80	37～43HRC	0 −0.005
GV−CPG−L	GV−CPGB−L	DH2F	38～42HRC	
GV−CPP−L	GV−CPPB−L	SKD61 equivalent	48～52HRC	
GV−CPH−L	GV−CPHB−L	SKH51 equivalent	58～60HRC	



D	P	d	a
0.5～ 0.9	0.50～ 0.99	(D or P)−0.1	0.05
1 ～ 2.5	1.00～ 2.49	(D or P)−0.2	0.10
3 ～ 4	2.50～ 3.99	(D or P)−0.4	0.20
4.5・ 5	4.00～ 4.99	(D or P)−0.6	0.30
6 ～13	5.00～12.99	(D or P)−1.0	0.50



When (D or P)$^{-0.01}_{-0.02}$, Shaft diameter selection: DC designation not available. DC=D
Shaft diameter designation: PC designation not availablePC=P

■Shaft diameter (D) selection type

H	Part Number		L	DC	N	SV	U/Price 1～4						
	Type	D	0.01mm increments	0.005mm increments	0.1mm increments	0.5mm increments	GV−CPN−L GV−CPF−L	GV−CPD−L	GV−CPX−L	GV−CPK−L GV−CPG−L		GV−CPP−L GV−CPH−L	
							Designated uselessness of DC・DCX (D=DC)			D=DC (DCX)	D≠DC	D=DC (DCX)	D≠DC
2	GV−CPX−L GV−CPH−L	0.5	15.00～ 60.00	(D−0.08)≦DC≦D When $D^{-0.01}_{-0.02}$, DC not available When DC=D, designation of DCX.	0.3～10.0	2.0～50.0 L−(2+SV+N)≧10							
3	GV−CPN−L (D≧0.8) GV−CPF−L (D≧0.8) GV−CPD−L	0.6	15.00～100.00										
		0.7											
		0.8											
		0.9											
		1											
		1.2											
		1.5											
4	GV−CPX−L	2											
5		2.5								Quotation			
6		3											
7	GV−CPK−L (D≧0.8)	3.5	15.00～120.00		0.5～15.0	2.0～60.0 L−(2+SV+N)≧10							
		4											
8	GV−CPG−L (D≧0.8)	4.5											
		5											
9		6											
10	GV−CPP−L	7											
11		8											
15	GV−CPH−L	10											
18		13											

■Shaft diameter (P) designation type

H	Part Number		0.01mm increments		PC	N	SV	U/Price 1～4						
	Type	No.	L	P	0.005mm increments	0.1mm increments	0.5mm increments	GV-CPNB-L GV-CPFB-L	GV-CPDB-L	GV-CPXB-L	GV-CPKB-L GV-CPGB-L		GV-CPPB-L GV-CPHB-L	
								Designated uselessness of PC・PCX (P=PC)			P=PC (PCX)	P≠PC	P=PC (PCX)	P≠PC
3	GV−CPXB−L GV−CPHB−L	0.6	15.00～100.00	0.50～ 0.59	(P−0.08)≦PC≦P When $P^{-0.01}_{-0.02}$ PC not available. When PC=P, designation of PCX.	0.3～10.0	2.0～50.0 L−(2+SV+N)≧10							
	GV−CPNB−L (P≧0.80)	1		0.60～ 0.99										
		1.5		1.00～ 1.49										
4	GV−CPFB−L	2		1.50～ 1.99										
5	(P≧0.80)	2.5		2.00～ 2.49										
6	GV−CPDB−L	3		2.50～ 2.99										
7	GV−CPXB−L	3.5	15.00～120.00	3.00～ 3.49		0.5～15.0	2.0～60.0 L−(2+SV+N)≧10				Quotation			
		4		3.50～ 3.99										
8		4.5		4.00～ 4.49										
	GV−CPKB−L	5		4.50～ 4.99										
9	(P≧0.80)	6		5.00～ 5.99										
10	GV−CPGB−L	7		6.00～ 6.99										
11	(P≧0.80)	8		7.00～ 7.99										
15	GV−CPPB−L	10		8.00～ 9.99										
18	GV−CPHB−L	13		10.00～12.99										

Order

Part Number	L	P	DC(DCX) PC(PCX)	N	SV
GV−CPX −L1	20.05			N2	SV4
GV−CPHB−L3	18.36	P2.96	PC2.950	N2	SV4

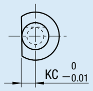
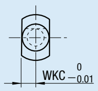
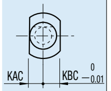
Days to Ship Quotation

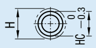
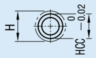
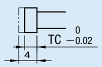
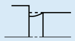
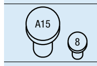
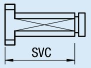
Price Quotation

Alterations

Part Number	L	P	DC(DCX) PC(PCX)	N	SV(SVC)	(KC・WKC···etc.)
GV−CPH −L3	18.36		DCX	N2	SVC	WKC1.5
GV−CPHB−L3	18.36	P2.96	PCX	N2	SVC	WKC1.48

Alteration details P.395

Alterations	Code	Spec.		1Code
 KC $^{0}_{-0.01}$	KC	Single flat cutting (D or P)/2≦KC＜H/2 (D or P)≧0.6	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC $^{0}_{-0.01}$	WKC	Two flats cutting (D or P)/2≦WKC＜H/2 (D or P)≧0.6		
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only (D or P)≧0.6 KAC＜KBC＜H/2		

Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
 H HCC $^{0}_{-0.02}$	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H−0.3, (D or P)≧0.6	
 TC $^{0}_{-0.02}$ 4	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L ・Shaft diameter (D) selection: D 0.5≦D＜0.8 TC 2.0≦TC＜4.0; D 0.8≦D≦13 TC 1.5≦TC＜4.0 ・Shaft diameter (P) designation: P 0.50≦P＜0.80 TC 2.0≦TC＜4.0; P 0.80≦P≦12.99 TC 1.5≦TC＜4.0	
	TRN	Relief under the head (No need for plate chamfering) Available when (D or P)≧0.6	
 A15 8	NHC	Numbering on the head How to order P.396 Available when H≧2	
 SVC	SVC	Extend the flat section SV to the bottom. Only available for GV−CPN−L・GV−CPK−L GV−CPNB−L・GV−CPKB−L when (D or P)≧2 (D or P)＜1 ···› L=Applicable until 60 When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

■ Characteristics

For the molds using the resin which generates gas easily, this core pin performs good effect of gas release from inside cavity through the clearance.

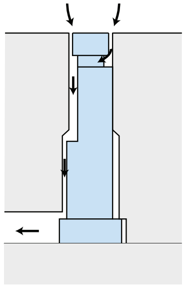
Example

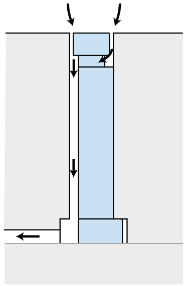
1. Assemble at the surface of product to release gas.
2. Assemble to the place where the gas gathers in the runner part, and release gas.

Gas is released from the clearance.

Please set clearance to include the way of gas-flow according to resin and molding condition (Designate on DC・PC).

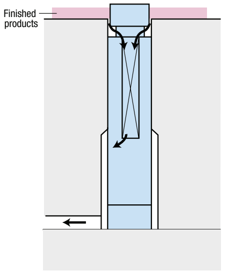
※ ⟶ Gas flow





＜Alteration SVC＞

Please use SVC alteration when processing plate by wire cutting.



＜Alteration WKC＞

SKD61
equivalent
SKH51
equivalent

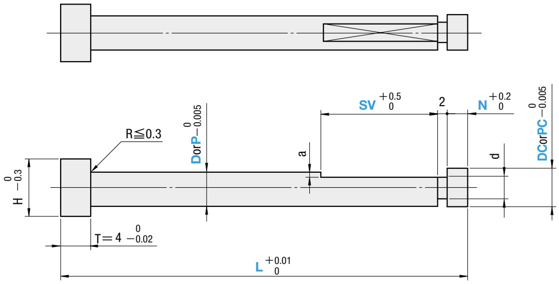
PRECISON GAS RELEASE STRAIGHT CORE PINS

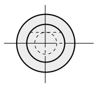
—SHAFT DIAMETER (D) SELECTION／(P) 0.005mm DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type		M	H
Shaft diameter (D) selection	Shaft diameter (P) designation		
GV—CPZ—L	GV—CPZB—L	SKD61 equivalent	48～52HRC
GV—CPV—L	GV—CPVB—L	SKH51 equivalent	58～60HRC





D	P	d	a
0.5～0.9	0.500～ 0.995	(D or P)—0.1	0.05
1 ～2.5	1.000～ 2.495	(D or P)—0.2	0.10
3 ～4	2.500～ 3.995	(D or P)—0.4	0.20
4.5・5	4.000～ 4.995	(D or P)—0.6	0.30
6 ～13	5.000～12.995	(D or P)—1.0	0.50

■Shaft diameter (D) selection type

H	Part Number		L	DC	N	SV
	Type	D	0.01mm increments	0.005mm increments	0.1mm increments	0.5mm increments
2	GV—CPV—L	0.5	15.00～ 60.00	(D—0.08)≦DC≦D When DC=D, designation of DCX.	0.3～10.0 L—(2+SV+N)≧10	2.0～50.0 L—(2+SV+N)≧10
3	GV—CPZ—L GV—CPV—L	0.6	15.00～100.00			
		0.7				
		0.8				
		0.9				
		1				
		1.2				
		1.5				
4		2				
5		2.5				
6		3				
7		3.5	15.00～120.00		0.5～15.0 L—(2+SV+N)≧10	2.0～60.0 L—(2+SV+N)≧10
		4				
8		4.5				
		5				
9		6				
10		7				
11		8				
15		10				
18		13				

■Shaft diameter (P) designation type

H	Part Number		L	P	PC	N	SV
	Type	No.	0.01mm increments	0.005mm increments	0.005mm increments	0.1mm increments	0.5mm increments
3	GV—CPVB—L	0.6	15.00～100.00	0.500～ 0.595	(P—0.08)≦PC≦P When PC=P, designation of PCX.	0.3～10.0 L—(2+SV+N)≧10	2.0～50.0 L—(2+SV+N)≧10
	GV—CPZB—L GV—CPVB—L	1		0.600～ 0.995			
		1.5		1.000～ 1.495			
4		2		1.500～ 1.995			
5		2.5		2.000～ 2.495			
6		3		2.500～ 2.995			
7		3.5	15.00～120.00	3.000～ 3.495		0.5～15.0 L—(2+SV+N)≧10	2.0～60.0 L—(2+SV+N)≧10
		4		3.500～ 3.995			
8		4.5		4.000～ 4.495			
		5		4.500～ 4.995			
9		6		5.000～ 5.995			
10		7		6.000～ 6.995			
11		8		7.000～ 7.995			
15		10		8.000～ 9.995			
18		13		10.000～12.995			

Order

Part Number	L	P	DC(DCX) PC(PCX)	N	SV
GV—CPZ—L3	18.36		DC2.955	N2	SV4
GV—CPVB—L1	20.05	P0.995	PCX	N2	SV4

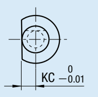
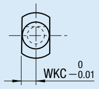
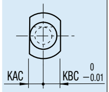
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	DC(DCX)・PC(PCX)	N	SV(SVC)	(KC・WKC…etc.)
GV—CPV—L3	18.36		DC2.990	N2	SVC	WKC1.5
GV—CPZB—L1	20.05	P0.995	PCX	N2	SV4	TRN

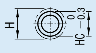
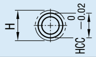
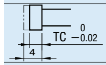
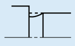
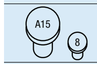
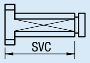
Alteration details P.395

Alterations	Code	Spec.	1Code
 KC $^{0}_{-0.01}$	KC	Single flat cutting (D or P)/2≦KC＜H/2 (D or P)≧0.6	Quotation
 WKC $^{0}_{-0.01}$	WKC	Two flats cutting (D or P)/2≦WKC＜H/2 (D or P)≧0.6	
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only (D or P)≧0.6 KAC＜KBC＜H/2	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation
Shaft diameter (D) selection 0.05mm increments possible
Shaft diameter (P) designation 0.0025mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
 H HCC $^{0}_{-0.02}$	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H—0.3, (D or P)≧0.6	
 TC $^{0}_{-0.02}$ 4	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4—TC≦Lmax.—L D or P: 0.5≦D or P＜0.8 — TC: 2.0≦TC＜4.0 D or P: 0.8≦D or P≦13 — TC: 1.5≦TC＜4.0	
	TRN	Relief under the head (No need for plate chamfering) (D or P)≧0.6	
	NHC	Numbering on the head How to order P.396 Available when H≧2	
 SVC	SVC	Extend the flat section SV to the bottom. (D or P)＜1 ···› L=Applicable until 60 When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

■ Characteristics

For the molds using the resin which generates gas easily, this core pin performs good effect of gas release from inside cavity through the clearance.

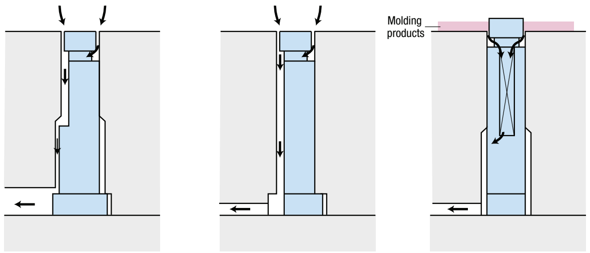
Example

1. Assemble at the surface of product to release gas.
2. Assemble to the place where the gas gathers in the runner part, and release gas.

Gas is released from the clearance.

Please set clearance to include the way of gas-flow according to resin and molding condition (Designate on DC・PC)

※ ⟶ Gas flow



＜Alteration SVC＞
Please use SVC alteration when processing plate by wire cutting.

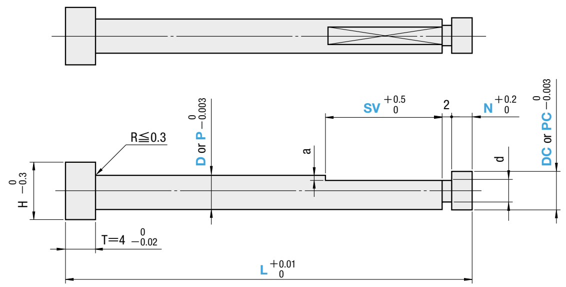
＜Alteration WKC＞

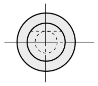
EXTRA PRECISON GAS RELEASE STRAIGHT CORE PINS

—SHAFT DIAMETER (D) SELECTION／(P) 0.001mm DESIGNATION TYPE—

RoHS

Type		M	H
Shaft diameter (D) selection	Shaft diameter (P) designation		
GV−CPM−L	GV−CPMB−L	SKH51 equivalent	58～60HRC





D	P	d	a
0.5～ 0.9	0.500～ 0.999	(D or P)−0.1	0.05
1 ～ 2.5	1.000～ 2.499	(D or P)−0.2	0.10
3 ～ 4	2.500～ 3.999	(D or P)−0.4	0.20
4.5・ 5	4.000～ 4.999	(D or P)−0.6	0.30
6 ～13	5.000～12.999	(D or P)−1.0	0.50

■Shaft diameter (D) selection type

H	Part Number		L	DC	N	SV
	Type	D	0.01mm increments	0.001mm increments	0.1mm increments	0.5mm increments
2	GV−CPM−L	0.5	15.00～ 60.00	(D−0.08)≦DC≦D When DC=D, designation of DCX.	0.3～10.0	2.0～50.0 L−(2+SV+N)≧10
3		0.6	15.00～100.00			
		0.8				
		1				
		1.2				
		1.5				
4		2				
5		2.5				
6		3				
7		3.5			0.5～15.0	2.0～60.0 L−(2+SV+N)≧10
		4				
8		4.5				
		5				
9		6				
10		7				
11		8				
15		10				
18		13				

■Shaft diameter (P) designation type

H	Part Number		L	P	PC	N	SV
	Type	No.	0.01mm increments	0.001mm increments	0.001mm increments	0.1mm increments	0.5mm increments
3	GV−CPMB−L	0.6	15.00～ 60.00	0.500～ 0.599	(P−0.08)≦PC≦P When PC=P, designation of PCX.	0.3～10.0	2.0～50.0 L−(2+SV+N)≧10
		1	15.00～100.00	0.600～ 0.999			
		1.5		1.000～ 1.499			
4		2		1.500～ 1.999			
5		2.5		2.000～ 2.499			
6		3		2.500～ 2.999			
7		3.5		3.000～ 3.499		0.5～15.0	2.0～60.0 L−(2+SV+N)≧10
		4		3.500～ 3.999			
8		4.5		4.000～ 4.499			
		5		4.500～ 4.999			
9		6		5.000～ 5.999			
10		7		6.000～ 6.999			
11		8		7.000～ 7.999			
15		10		8.000～ 9.999			
18		13		10.000～12.999			

Order

Part Number	—	L	—	P	—	DC(DCX) PC(PCX)	—	N	—	SV
GV−CPM−L3	—	18.36			—	DC2.950	—	N2	—	SV4
GV−CPMB−L1	—	20.05	—	P0.995	—	PCX	—	N2	—	SV4

Days to Ship Quotation

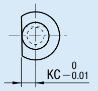
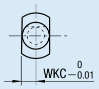
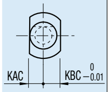
Non JIS material definition is listed on P.1351 - 1352

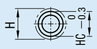
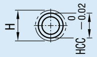
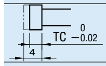
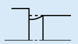
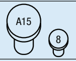
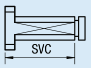
Price Quotation

Alterations

Part Number	—	L	—	P	—	DC(DCX)・PC(PCX)	—	N	—	SV(SVC)	—	(KC・WKC…etc.)
GV−CPM−L1	—	20.05			—	DCX	—	N2	—	SV4	—	TRN
GV−CPMB−L3	—	18.36	—	P2.960	—	PC2.950	—	N2	—	SVC	—	WKC1.48

Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2 (D or P)≧0.6	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.0005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting (D or P)/2≦WKC<H/2 (D or P)≧0.6		Quotation
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only (D or P)≧0.6 KAC<KBC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3, (D or P)≧0.6	
	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) 4−TC≦Lmax.−L D or P / TC 0.50≦D or P<0.80 / 2.0≦TC<4.0 0.80≦D or P≦13 / 1.5≦TC<4.0	Quotation
	TRN	Relief under the head (No need for plate chamfering) Available when (D or P)≧0.6	
	NHC	Numbering on the head How to order P.396 Available when H≧2	
	SVC	Extend the flat section SV to the bottom. (D or P)<1 ⋯▸ L=Applicable until 60 When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

■ Characteristics

For the molds using the resin which generates gas easily, this core pin performs good effect of gas release from inside cavity through the clearance.

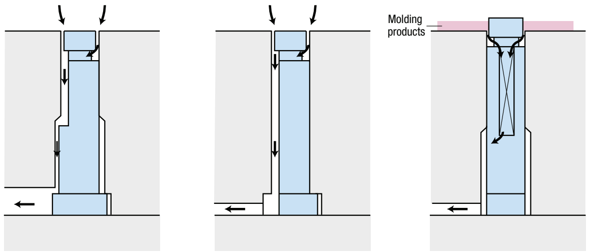
Example

1. Assemble at the surface of product to release gas.
2. Assemble to the place where the gas gathers in the runner part, and release gas.

Gas is released from the clearance.

Please set clearance to include the way of gas-flow according to resin and molding condition (Designate on DC・PC)

※ ⟶ Gas flow



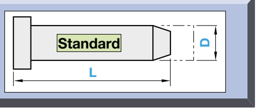
<Alteration SVC>

Please use SVC alteration when processing plate by wire cutting.

<Alteration WKC>

STRAIGHT CORE PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS

For SKH51 equivalent, the other shapes have been standardized as well. P.419

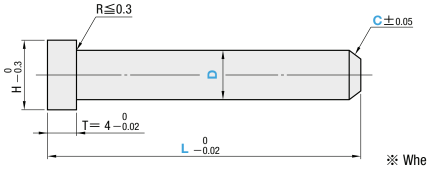
M H	Part Number		
	Type		Shape
	T $D^{-0.01}_{-0.02}$	T $D^{0}_{-0.005}$	
NAK80 37～43HRC	CPNL	CPKL	C
DH2F 38～42HRC	CPFL	CPGL	G
SKD61 equivalent 48～52HRC	CPDL	CPPL	T
SKH51 equivalent 58～60HRC	CPXL	CPHL	R
SUS440C 56～60HRC	—	CPWL	
MAS1C 50～54HRC	CPAL	CPYL	B

MAS1C will be discontinued when stocked materials are finished.

Shape (Tip shape)

Shape C

(C chamfered)



When no C specified

C=0.4±0.1

C···0.1mm increments

$0.1 \leqq C \leqq \frac{D-0.2}{2}$

and

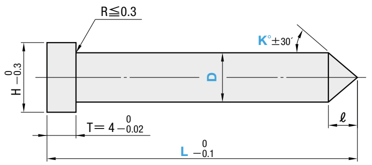
$L-C \geqq 9.5$

When CKC code is used
CKC=0.05mm increments

※ When GVC code is used ℓ=C (When CKC code is used:ℓ=CKC)

Shape G

(Cone)



K···0.5° increments

$20 \leqq K \leqq 60$

and

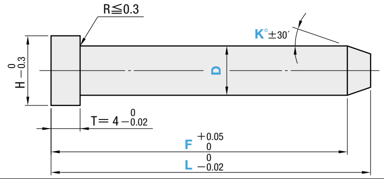
$(L-\ell) \geqq 10$

ℓcalculation formula

$\ell=\frac{D}{2\tan K}$

Shape T

(Tapered)



F···0.01mm increments

$F \geqq 10.00$

and

$0.3 \leqq (L-F) \leqq \frac{L}{2}$

and

$\frac{D}{2}-(L-F)\tan K \geqq 0.1$

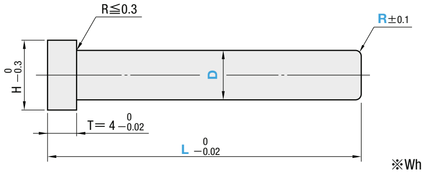
K···1° increments

$1 \leqq K \leqq 45$

※When GVC code is used ℓ=L−F

Shape R

(R chamfered)



When no R specified

R=0.4±0.1

R···0.1mm increments

$0.2 \leqq R \leqq \frac{D-0.2}{2}$

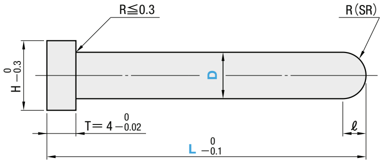
and

$L-R \geqq 10$

※When GVC code is used ℓ=R (When RTC code is used:ℓ=RTC)

Shape B

(Spherical processed)



Fixed dimension for R
Spherical processed (SR)

When RC code is used
RC=0.1mm increments
$D/2 \leqq RC \leqq (1.5\times D)$
{D≧4 ··· $D/2 \leqq RC \leqq (3\times D)$}
However, RC≦32
and
$L-\ell \geqq 10$
ℓcalculation formula
$\ell=RC-\sqrt{RC^2-\frac{D^2}{4}}$

H	Part Number					
	Type		Shape	D	L 0.01mm increments	Shape (Tip size)
	Shaft diameter tolerance $D^{-0.01}_{-0.02}$	Shaft diameter tolerance $D^{0}_{-0.005}$				
3	CPNL CPFL CPDL CPXL — CPAL (D≦4)	CPKL CPGL CPPL CPHL CPWL CPYL (D≦4)	C G T R B	0.8	10.00～100.00	**Shape** C C···0.1mm increments When no C specified C=0.4±0.1 **Shape** G K···0.5° increments **Shape** T F···0.01mm increments K···1° increments **Shape** R R···0.1mm increments When no R specified R=0.4±0.1 Refer to the working limits shown in the drawing.
				0.9		
				1		
				1.1		
				1.2		
				1.3		
				1.4		
				1.5		
4				1.6		
				1.7		
				1.8		
				1.9		
				2		
5				2.5		
6				3		
7				3.5	10.00～120.00	
				4		
8				4.5		
				5		
9				5.5		
				6		
10				6.5		
				7		
11				8		
15				10		
18				13		
21				16		
25	CPDL CPXL	CPPL CPHL		20		

Order

Part Number	—	L	—	Tip size (C・F・K・R)
CPKLG13	—	21.80	—	K45
CPHLB10	—	40.00		

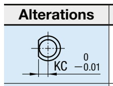
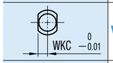
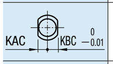
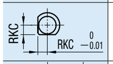
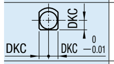
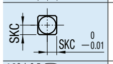
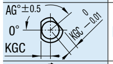
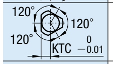
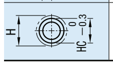
Days to Ship Quotation

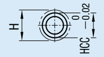
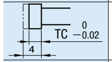
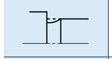
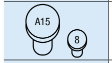
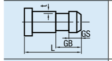
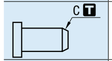
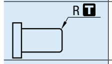
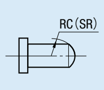
Alterations

Part Number	—	L	—	Tip size C(CKC)・F・K・R(RTC)	—	(KC・WKC···etc.)
CPWLB0.8	—	13.00			—	HCC2.5
CPHLT1	—	40.00	—	F39.00 — K10	—	WKC0.5—TC2.0

Price Quotation

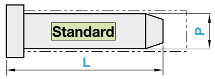
Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		

Alterations	Code	Spec.	1Code
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	Quotation
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 Available when H≧2 ⊗ Combination with SKC not available.	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2+ℓ≦GS≦12 GS+2≦GB≦30 L−GB≧10 How to order P.396	
	CKC	Improves C chamfering tolerance C±0.05 ···› ±0.02 0.1≦CKC≦(D−0.2)/2 L−CKC≧9.5 Available for **Shape** C only CKC=0.05mm increments	
	RTC	Improves tip R tolerance R±0.1 ···› ±0.05 0.2≦RTC≦(D−0.2)/2 L−RTC≧10 Available for **Shape** R only RTC=0.1mm increments	
	RC	Tip R alteration RC=0.1mm increments D/2≦RC≦RCmax. and L−ℓ≧10 Shaft diameter D<4 ···› RCmax.=1.5×D Shaft diameter D≧4 ···› RCmax.=3×D However, RC≦32 Available for **Shape** B only	

STRAIGHT CORE PINS WITH TIP PROCESS

—SHAFT DIAMETER (P) 0.01mm DESIGNATION TYPE—



Non JIS material definition is listed on P.1351 - 1352

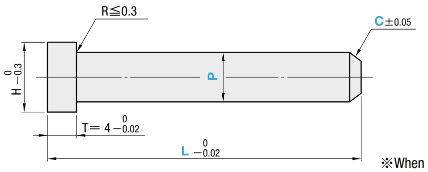
For SKH51 equivalent, the other shapes have been standardized as well. P.419

M / H	Part Number Type T $P^{-0.01}_{-0.02}$	Part Number Type T $P^{0}_{-0.005}$	Shape
NAK80 37～43HRC	CPNBL	CPKBL	C
DH2F 38～42HRC	CPFBL	CPGBL	G
SKD61 equivalent 48～52HRC	CPDBL	CPPBL	T
SKH51 equivalent 58～60HRC	CPXBL	CPHBL	R
SUS440C 56～60HRC	—	CPWBL	B
MAS1C 50～54HRC	CPABL	CPYBL	

MAS1C will be discontinued when stocked materials are finished.

Shape (Tip shape)

Shape C (C chamfered)



When no C specified
C=0.4±0.1

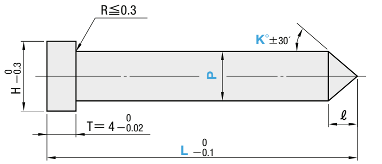
C…0.1mm increments

$0.1 \leqq C \leqq \frac{P-0.2}{2}$
and
$L-C \geqq 9.5$

When CKC code is used
CKC=0.05mm increments

※When GVC code is used ℓ=C (When combined with CKC:ℓ=CKC)

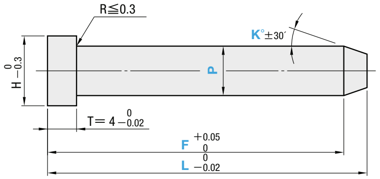
Shape G (Cone)



K…0.5° increments
$20 \leqq K \leqq 60$
and
$(L-\ell) \geqq 10$

ℓ calculation formula
$\ell = \frac{P}{2\tan K}$

Shape T (Tapered)

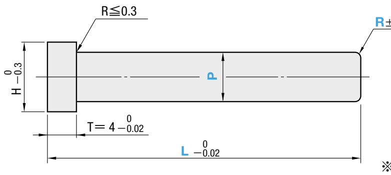


F…0.01mm increments
$F \geqq 10.00$
and
$0.3 \leqq (L-F) \leqq \frac{L}{2}$
and
$\frac{P}{2}-(L-F)\tan K \geqq 0.1$

K…1° increments
$1 \leqq K \leqq 45$

※When GVC code is used ℓ=L−F

Shape R (R chamfered)

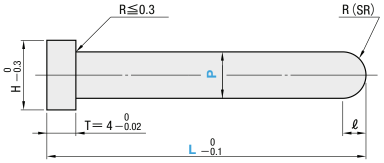


When no R specified
R=0.4±0.1

R…0.1mm increments
$0.2 \leqq R \leqq \frac{P-0.2}{2}$
and
$L-R \geqq 10$

※When GVC code is used ℓ=R (When combined with RTC:ℓ=RTC)

Shape B (Spherical processed)



Fixed dimension for R
Spherical processed (SR)
$\{R(SR)=\frac{P}{2}\}$
$L-\frac{P}{2} \geqq 7$

When RC code is used
RC=0.1mm increments
$P/2 \leqq RC \leqq (1.5 \times P)$
$\{P \geqq 4 \cdots\rightarrow P/2 \leqq RC \leqq (3 \times P)\}$
However, $RC \leqq 32$
and
$L-\ell \geqq 10$
ℓ calculation formula
$\ell = RC-\sqrt{RC^2-\frac{P^2}{4}}$

H	Part Number Type: Shaft diameter tolerance $P^{-0.01}_{-0.02}$	Part Number Type: Shaft diameter tolerance $P^{0}_{-0.005}$	Shape	No.	0.01mm increments L	0.01mm increments P	Shape (Tip size)
3	CPNBL CPFBL CPDBL CPXBL — CPABL (0.8≦P≦3.99)	CPKBL CPGBL CPPBL — CPHBL CPWBL CPYBL (0.8≦P≦3.99)	C G T R B	1	10.00 ～ 100.00	0.80～ 0.99	**Shape** C C…0.1mm increments When no C specified C=0.4±0.1
				1.5		1.00～ 1.49	
4				2		1.50～ 1.99	
5				2.5		2.00～ 2.49	
6				3		2.50～ 2.99	
				3.5	10.00 ～ 120.00	3.00～ 3.49	**Shape** G K…0.5° increments
7				4		3.50～ 3.99	
				4.5		4.00～ 4.49	
8				5		4.50～ 4.99	**Shape** T F…0.01mm increments K…1° increments
				5.5		5.00～ 5.49	
9				6		5.50～ 5.99	
				6.5		6.00～ 6.49	
10				7		6.50～ 6.99	
11				8		7.00～ 7.99	**Shape** R R…0.1mm increments When no R specified R=0.4±0.1
15				10		8.00～ 9.99	
18				13		10.00～12.99	
21				16		13.00～15.99	
25	CPDBL CPXBL	CPPBL CPHBL		20		16.00～19.99	Refer to the working limits shown in the drawing.

Order

Part Number	—	L	—	P	—	Tip size (C・F・K・R)		
CPPBLR 4.5	—	77.50	—	P4.40	—	R0.5		
CPGBLT 4.5	—	23.58	—	P4.10	—	F21.06	—	K1

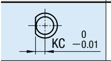
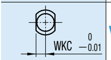
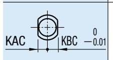
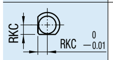
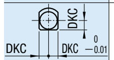
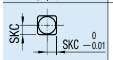
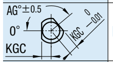
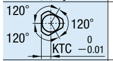
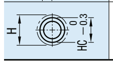
Quotation

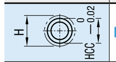
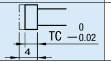
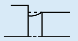
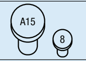
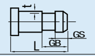
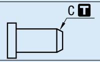
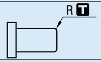
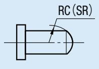
Alterations

Part Number	—	L	—	P	—	Tip size C(CKC)・F・K・R(RTC)	—	(KC・WKC…etc.)
CPHBLB 2.5	—	33.50	—	P2.20			—	HC4.0
CPKBLC 4.5	—	33.62	—	P4.10			—	CKC0.50

Price Quotation

Alteration details P.395

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	

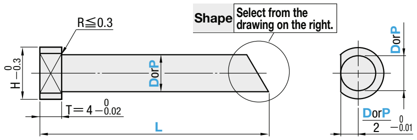
Alterations	Code	Spec.	1Code
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 Available when H≧2 ⊗ Combination with SKC not available.	Quotation
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2 2+ℓ≦GS≦12 GS+2≦GB≦30 L−GB≧10 How to order P.396	
	CKC	Improves C chamfering tolerance C±0.05 ⋯→ ±0.02 0.1≦CKC≦(P−0.2)/2 L−CKC≧9.5 Available for **Shape** C only CKC=0.05mm increments	
	RTC	Improves tip R tolerance R±0.1 ⋯→ ±0.05 0.2≦RTC≦(P−0.2)/2 L−RTC≧10 Available for **Shape** R only RTC=0.1mm increments	
	RC	Tip R alteration RC=0.1mm increments P/2<RC≦RCmax. and L−ℓ≧10 Shaft diameter P<4 ⋯→ RCmax.=1.5×P Shaft diameter P≧4 ⋯→ RCmax.=3×P However, RC≦32 Available for **Shape** B only	

STRAIGHT CORE PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS



Type Shaft diameter (D) selection	Type Shaft diameter (P) designation	M	H	T D or P
CPD□□	CPDB□□	SKD61 equivalent	48～52HRC	$_{-0.02}^{-0.01}$
CPX□□	CPXB□□	SKH51 equivalent	58～60HRC	
CPP□□	CPPB□□	SKD61 equivalent	48～52HRC	$_{-0.005}^{0}$
CPH□□	CPHB□□	SKH51 equivalent	58～60HRC	

To decide the shape processing position, process a key flat cutting on the standard 0°.

■Shaft Diameter (D) Selection Type

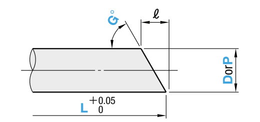
H	Part Number Type	Part Number Shape	Part Number D	0.01mm increments L	U/Price 1～4 CPX□□・CPP□□・CPH□□ 1G	 2G・1R・3R	 1Z	 2R・4R	 5R	 CPD□□ 1G	 2G・1R・3R	 1Z	 2R・4R	 5R
3	CPD CPX (D $_{-0.02}^{-0.01}$) CPP CPH (D $_{-0.005}^{0}$)	1G 1R 2R 3R 4R	1	15.01～100.00	Quotation									
			1.2											
			1.5											
4		1G 2G 1Z 1R 2R 3R 4R 5R	2											
5			2.5											
6			3											
7			3.5	15.01～120.00										
			4											
8			4.5											
			5	15.01～150.00										
9			5.5											
			6											
10			6.5											
			7											
11			8											
15			10											
18			13											
21			16											

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	Part Number Type	Part Number Shape	Part Number No.	0.01mm increments L	0.01mm increments P	U/Price 1～4 CPXB□□・CPPB□□・CPHB□□ 1G	 2G・1R・3R	 1Z	 2R・4R	 5R	 CPDB□□ 1G	 2G・1R・3R	 1Z	 2R・4R	 5R
3	CPDB CPXB (P $_{-0.02}^{-0.01}$) CPPB CPHB (P $_{-0.005}^{0}$)	1G 1R 2R 3R 4R	1.5	15.01～100.00	1.00～ 1.49	Quotation									
4			2		1.50～ 1.99										
5		1G 2G 1Z 1R 2R 3R 4R 5R	2.5		2.00～ 2.49										
6			3		2.50～ 2.99										
7			3.5	15.01～120.00	3.00～ 3.49										
			4		3.50～ 3.99										
8			4.5		4.00～ 4.49										
			5	15.01～150.00	4.50～ 4.99										
9			5.5		5.00～ 5.49										
			6		5.50～ 5.99										
10			6.5		6.00～ 6.49										
			7		6.50～ 6.99										
11			8		7.00～ 7.99										
15			10		8.00～ 9.99										
18			13		10.00～12.99										
21			16		13.00～15.99										

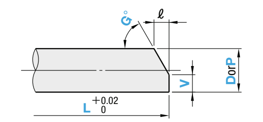
Shape

1G (Slope processing)



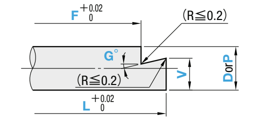
- $L-\ell \geqq 15$
- $\ell = P\tan(90-G)$
- $45° \leqq G < 90°$

2G (Slope part- processing)



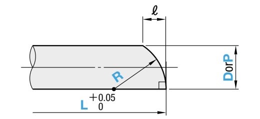
- $L-\ell \geqq 15$
- $\ell = (P-V)\tan(90-G)$
- $45° \leqq G < 90°$
- $1.5 \leqq V < P$

1Z (Z groove)



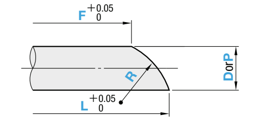
- $0° \leqq G \leqq 45°$
- $1.5 \leqq V < P$
- $L-F \leqq 10$
- $V-(L-F)\tan G \geqq 1$
- ⊗ R designation not available.
- $F \geqq 15$

1R (Outer R processing)



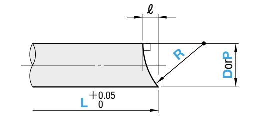
- $L-R \geqq 15$
- $\ell = R-\sqrt{R^2-P^2}$
- $P \leqq R \leqq 15$

2R (Outer R processing・F designation)



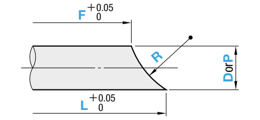
- $F \geqq 15$
- $P < R \leqq 15$
- $L-F > R-\sqrt{R^2-P^2}$

3R (Inner R processing)



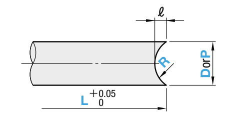
- $L-\ell \geqq 15$
- $\ell = R-\sqrt{R^2-P^2}$
- $P \leqq R \leqq 15$

4R (Inner R processing・F designation)

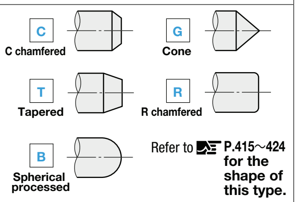


- $F \geqq 15$
- $P < R \leqq 15$
- $L-F > R-\sqrt{R^2-P^2}$

5R (R groove)



- $L-\ell \geqq 15$
- $\ell = R-\sqrt{R^2-\left(\frac{P}{2}\right)^2}$
- $1.2P \leqq R \leqq 2P$



Refer to P.415～424 for the shape of this type.

In the machining condition formula, D=P for shaft diameter (D) selection type.

Order

Part Number	—	L	—	P	—	Sequence of G/V/R/F
(Shaft diameter (D) selection type) CPH1G 5	—	40.00			—	G60
(Shaft diameter (P) designation type) CPHB3R6	—	60.00	—	P5.95	—	R10

Days to Ship Quotation

■Unit of designation

T	Unit of designation
G±30′	1° increments
R±0.02	0.1mm increments
V±0.05	0.1mm increments
F	0.01mm increments

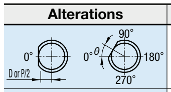
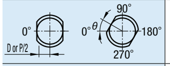
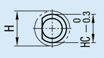
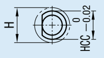
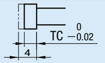
P Price Quotation

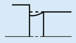
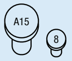
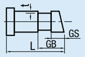
Alterations

Part Number	—	L	—	P	—	Sequence of G/V/R/F	—	(AKC・AWC…etc.)
CPH2G10	—	50.00			—	G70 — V2.0	—	AKC45

⊗ **NHC** Express service not available

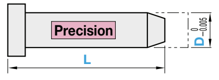
Alteration details P.395

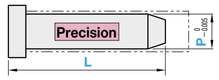
Alterations	Code	Spec.	1Code
	AKC	Head angle alteration AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	Head angle alteration (2 planes) AWC=1° increments 0≦AWC<360	
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	Quotation
	NHC	Numbering on the head How to order P.396	
	GVC	Gas vent machining GS・GB=1mm increments 2+ℓ≦GS≦12 GS+2≦GB≦30 2+(L−F)≦GS≦12 L−GB≧10 How to order P.396	

PRECISION STRAIGHT CORE PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.005mm INCREMENTS) TYPE—



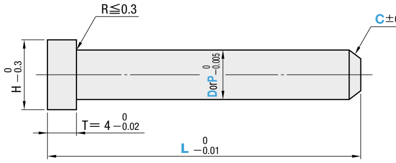


RoHS

M H	Type: Shaft diameter (D) selection	Type: Shaft diameter (P) designation	Shape
SKD61 equivalent 48～52HRC	CPZL	CPZBL	C G T R B
SKH51 equivalent 58～60HRC	CPVL	CPVBL	

Shape (Tip shape)

Shape C
(C chamfered)



C…0.05mm increments

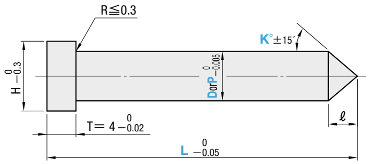
$$0.1 \leqq C \leqq \frac{(D \text{ or } P)-0.2}{2}$$

and

L—C≧9.5

※When GVC code is used ℓ=C

Shape G
(Cone)



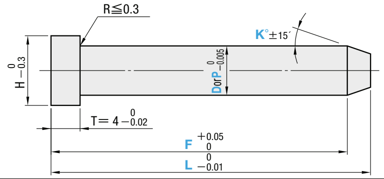
K…0.5° increments

20≦K≦60
and
(L—ℓ)≧10

ℓ calculation formula

$$\ell = \frac{(D \text{ or } P)}{2\tan K}$$

Shape T
(Tapered)



F…0.01mm increments

F≧10.00

and

$$0.3 \leqq (L-F) \leqq \frac{L}{2}$$

and

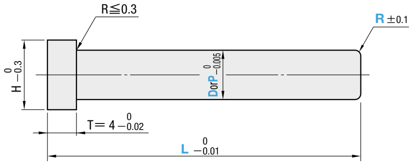
$$\frac{(D \text{ or } P)}{2}-(L-F)\tan K \geqq 0.1$$

※When GVC code is used ℓ=L—F

K…1° increments

1≦K≦45

Shape R
(R chamfered)



R…0.1mm increments

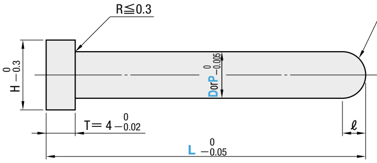
$$0.2 \leqq R \leqq \frac{(D \text{ or } P)-0.2}{2}$$

and

L—R≧10

※When GVC code is used ℓ=R

Shape B
(Spherical processed)



R(SR)±0.1
When R=(D or P)/2
designate RQR

When R>(D or P)/2
R…0.1mm increments
(D or P)/2<R≦1.5×(D or P)
{(D or P)≧4…›(D or P)/2<R≦3×(D or P)}
However, R≦32 and L—ℓ≧10

ℓ calculation formula

$$\ell = R-\sqrt{R^2-\frac{(D^2 \text{ or } P^2)}{4}}$$

Non JIS material definition is listed on P.1351 - 1352

■Shaft diameter (D) selection type

H	Part Number: Type	Part Number: Shape	D	L 0.01mm increments	Shape (Tip size)
3	CPVL	C G T R B	0.6	10.00～60.00	**Shape** C C…0.05mm increments **Shape** G K…0.5° increments **Shape** T F…0.01mm increments K…1° increments **Shape** R R…0.1mm increments **Shape** B When R=D/2 designate RQR When R>D/2 R…0.1mm increments Refer to the working limits shown in the drawing.
	CPZL CPVL		0.8	10.00～100.00	
			0.9		
			1		
			1.1		
			1.2		
			1.3		
			1.4		
			1.5		
4			1.6		
			1.7		
			1.8		
			1.9		
			2		
5			2.5		
6			3		
7			3.5	10.00～120.00	
			4		
8			4.5		
			5		
9			5.5		
			6		
10			6.5		
			7		
11			8		
15			10		
18			13		
21			16		
25			20		

■Shaft diameter (P) designation type

H	Part Number: Type	Part Number: Shape	No.	L 0.01mm increments	P 0.005mm increments	Shape (Tip size)
3	CPVBL	C G T R B	0.8	10.00～60.00	0.600～ 0.795	**Shape** C C…0.05mm increments **Shape** G K…0.5° increments **Shape** T F…0.01mm increments K…1° increments **Shape** R R…0.1mm increments **Shape** B When R=P/2 designate RQR When R>P/2 R…0.1mm increments Refer to the working limits shown in the drawing.
	CPZBL CPVBL		1	10.00～100.00	0.800～ 0.995	
			1.5		1.000～ 1.495	
4			2		1.500～ 1.995	
5			2.5		2.000～ 2.495	
6			3		2.500～ 2.995	
7			3.5	10.00～120.00	3.000～ 3.495	
			4		3.500～ 3.995	
8			4.5		4.000～ 4.495	
			5		4.500～ 4.995	
9			5.5		5.000～ 5.495	
			6		5.500～ 5.995	
10			6.5		6.000～ 6.495	
			7		6.500～ 6.995	
11			8		7.000～ 7.995	
15			10		8.000～ 9.995	
18			13		10.000～12.995	
21			16		13.000～15.995	
25			20		16.000～19.995	

Order

Part Number	—	L	—	P	—	Tip size (C・F・K・R)
CPZLC5	—	13.07			—	C0.3
CPVBLB7	—	67.00	—	P6.600	—	RQR

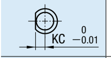
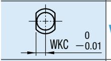
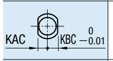
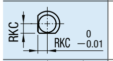
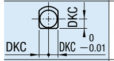
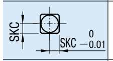
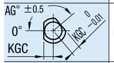
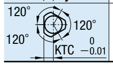
Price Quotation

Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	Tip size (C・F・K・R)	—	(KC・WKC…etc.)
CPZLC2	—	10.00			—	C0.5	—	HC3.0
CPVBLR10	—	17.00	—	P8.620	—	R1.5	—	HC10.6 — KTC4.5

Alteration details ☞ P.395

Alterations	Code	Spec.	1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2	
	WKC	Two flats cutting (D or P)/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2	Quotation
	DKC	Three flats cutting (D or P)/2≦DKC<H/2	
	SKC	Four flats cutting (D or P)/2≦SKC<H/2	
	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2	

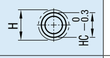
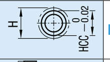
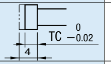
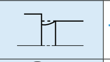
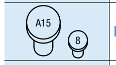
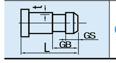
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter

Unit of designation
Shaft diameter (D) selection
0.05mm increments possible
Shaft diameter (P) designation
0.0025mm increments possible

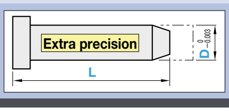
(2)To designate arbitrary key flat dimensions

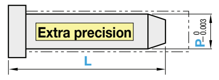
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H—0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4—TC≦Lmax.—L	Quotation
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order ☞ P.396 Available when H≧2 ⊗ Combination with SKC not available.	
	GVC	Gas vent machining GS・GB=1mm increments Available when (D or P)≧2 2+ℓ≦GS≦12 GS+2≦GB≦30 L—GB≧10 How to order ☞ P.396	

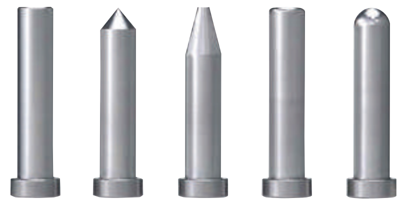
EXTRA PRECISION STRAIGHT CORE PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.001mm INCREMENTS) TYPE—





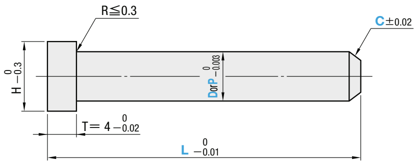
Non JIS material definition is listed on P.1351 - 1352



M H	Part Number	
	Type	Shape
SKH51 equivalent 58～60HRC	Shaft diameter (D) selection type **CPML** Shaft diameter (P) designation type **CPMBL**	C G T R B

Shape (Tip shape)

Shape C
(C chamfered)



C…0.05mm increments

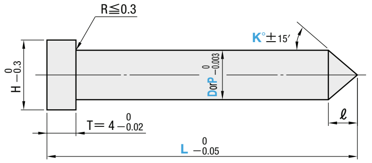
$$0.1 \leqq C \leqq \frac{(D\text{ or }P)-0.2}{2}$$

and

$$L-C \geqq 9.5$$

※When GVC code is used ℓ=C

Shape G
(Cone)



K…0.5° increments

$$20 \leqq K \leqq 60$$

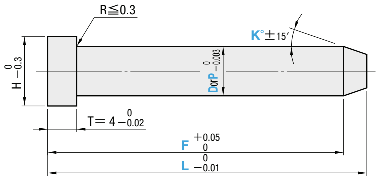
and

$$(L-\ell) \geqq 10$$

ℓ calculation formula

$$\ell = \frac{(D\text{ or }P)}{2\tan K}$$

Shape T
(Tapered)



F…0.01mm increments

$$F \geqq 10.00$$

and

$$0.3 \leqq (L-F) \leqq \frac{L}{2}$$

※When GVC code is used ℓ=L−F

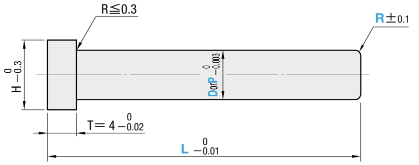
and

$$\frac{(D\text{ or }P)}{2}-(L-F)\tan K \geqq 0.1$$

K…1° increments

$$1 \leqq K \leqq 45$$

Shape R
(R chamfered)



R…0.1mm increments

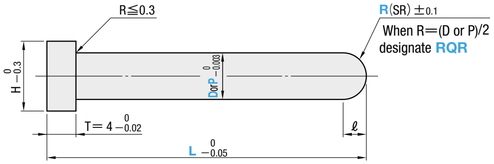
$$0.2 \leqq R \leqq \frac{(D\text{ or }P)-0.2}{2}$$

and

$$L-R \geqq 10$$

※When GVC code is used ℓ=R

Shape B
(Spherical processed)



When R=(D or P)/2 designate RQR

When R>(D or P)/2
R…0.1mm increments
(D or P)/2<R≦1.5×(D or P)
{(D or P)≧4 ⋯ (D or P)/2<R≦3×(D or P)}
However, R≦32 and L−ℓ≧10

ℓ calculation formula

$$\ell = R-\sqrt{R^2-\frac{(D^2\text{or}P^2)}{4}}$$

■Shaft diameter (D) selection type

H	Part Number			L	Shape
	Type	Shape	D	0.01mm increments	(Tip size)
3	CPML	C G T R B	0.6	10.00～60.00	Shape C C…0.05mm increments Shape G K…0.5° increments Shape T F…0.01mm increments K…1° increments Shape R R…0.1mm increments Shape B When R=D/2 designate RQR When R>D/2 R…0.1mm increments Refer to the working limits shown in the drawing.
			0.8		
			1		
			1.5		
4			2		
5			2.5		
6			3		
7			3.5		
			4		
8			4.5		
			5		
9			5.5		
			6		
10			6.5		
			7		
11			8		
15			10		
18			13		

■Shaft diameter (P) designation type

H	Part Number			L	P	Shape
	Type	Shape	No.	0.01mm increments	0.001mm increments	(Tip size)
3	CPMBL	C G T R B	0.8	10.00～60.00	0.600～ 0.799	Shape C C…0.05mm increments Shape G K…0.5° increments Shape T F…0.01mm increments K…1° increments Shape R R…0.1mm increments Shape B When R=P/2 designate RQR When R>P/2 R…0.1mm increments Refer to the working limits shown in the drawing.
			1		0.800～ 0.999	
			1.5		1.000～ 1.499	
4			2		1.500～ 1.999	
5			2.5		2.000～ 2.499	
6			3		2.500～ 2.999	
7			3.5		3.000～ 3.499	
			4		3.500～ 3.999	
8			4.5		4.000～ 4.499	
			5		4.500～ 4.999	
9			5.5		5.000～ 5.499	
			6		5.500～ 5.999	
10			6.5		6.000～ 6.499	
			7		6.500～ 6.999	
11			8		7.000～ 7.999	
15			10		8.000～ 9.999	
18			13		10.000～12.999	

Order

Part Number	L	P	Tip size (C・F・K・R)
CPMLC 3	35.72		C0.2
CPMBLB 3	35.72	P2.770	R2.1

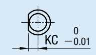
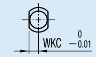
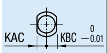
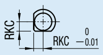
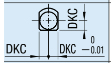
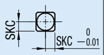
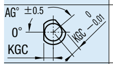
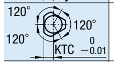
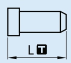
Price Quotation

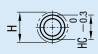
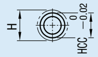
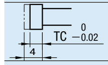
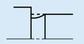
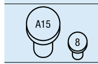
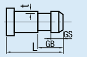
Days to Ship Quotation

Alterations

Part Number	L	P	Tip size (C・F・K・R)	(KC・WKC…etc.)
CPMLR3.5	45.47		R0.3	WKC2.3
CPMBLT5	34.00	P4.560	F30.00 — K5	HC6

Alteration details P.395

Alterations	Code	Spec.	1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.0005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting (D or P)/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2	
	DKC	Three flats cutting (D or P)/2≦DKC<H/2	
	SKC	Four flats cutting (D or P)/2≦SKC<H/2	
	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2	
	LKC	L dimension tolerance alteration $L^{\ 0}_{-0.01} \dashrightarrow L^{\ 0}_{-0.005}$ (L dimension: designation in 0.005mm increments possible) Available when 1.5≦(D or P)≦5 Available when Shape C・T・R	

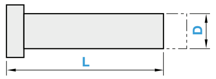
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 Available when H≧2 Combination with SKC not available.	
	GVC	Gas vent machining GS・GB=1mm increments Available when (D or P)≧2 2+ℓ≦GS≦12 GS+2≦GB≦30 L−GB≧10 How to order P.396	

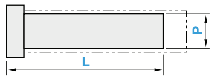
JIS head

Dies Steel
SKD61 equivalent

STRAIGHT CORE PINS

—SHAFT DIAMETER (D) SELECTION／SHAFT DIAMETER (P) DESIGNATION・L DIMENSION DESIGNATION TYPE—

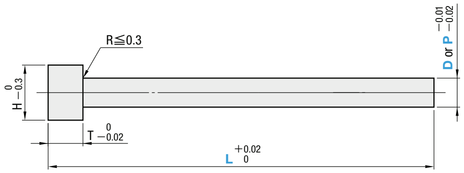




Non JIS material definition is listed on P.1351 - 1352

RoHS

Type		M	H	T	
Shaft diameter (D) selection	Shaft diameter (P) designation			D or P	L
CPDJ—L	CPDJB—L	SKD61 equivalent	48～52HRC	−0.01 −0.02	+0.02 0



■Shaft diameter (D) selection type

H	T	Part Number		L
		Type	D	0.01mm increments
8	6	CPDJ—L	4	30.00～120.00
			4.5	
9			5	
			5.5	
10			6	
11			6.5	
			7	
13	8		8	
15			10	

■Shaft diameter (P) designation type

H	T	Part Number		L	P
		Type	No.	0.01mm increments	0.01mm increments
8	6	CPDJB—L	4	30.00～120.00	3.50～3.99
9			5		4.00～4.99
10			6		5.00～5.99
13	8		8		6.00～7.99
15			10		8.00～9.99

Order

・Shaft diameter (D) selection type

Part Number	—	L
CPDJ—L5	—	72.35

・Shaft diameter (P) designation type

Part Number	—	L	—	P
CPDJB—L6	—	35.72	—	P5.87

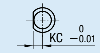
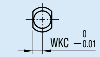
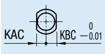
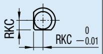
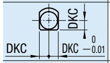
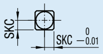
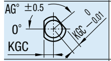
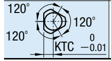
Days to Ship Quotation

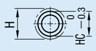
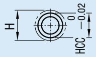
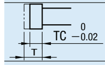
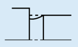
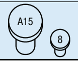
Price Quotation

Alterations

Part Number	—	L	—	(KC・WKC…etc.)
CPDJ—L5	—	72.35	—	HC 7.0

Alteration details P.395

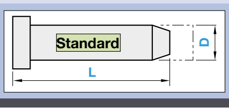
Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting (D or P)/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC＜H/2		
	DKC	Three flats cutting (D or P)/2≦DKC＜H/2		
	SKC	Four flats cutting (D or P)/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting (D or P)/2≦KGC＜H/2 0＜AG＜360 AG=1° increments		
	KTC	Three flats cutting at 120° (D or P)/2≦KTC＜H/2		

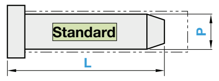
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H−0.3	
	TC	Head thickness change TC=0.1mm increments (Dimension L remains unchanged.) T/2≦TC＜T T−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 ⊗ Combination with SKC not available.	

JIS head

STRAIGHT CORE PINS WITH TIP PROCESS

—SHAFT DIAMETER (D) SELECTION／SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—



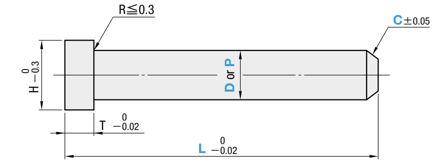


RoHS

M H	Part Number Type	Part Number Shape	T D or P
SKD61 equivalent 48～52HRC	Shaft diameter (D) selection type **CPDJL** Shaft diameter (P) designation type **CPDJBL**	C G T R B	−0.01 −0.02

Shape (Tip shape)

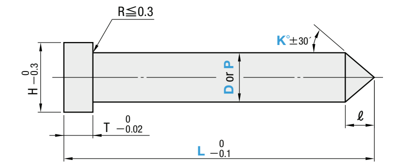
Shape C
(C chamfered)



When no C specified
C=0.4±0.1
C···0.1mm increments
$0.1 \leqq C \leqq \frac{(D \text{ or } P)-0.2}{2}$
and
L−C≧9.5

When CKC code is used
CKC=0.05mm increments

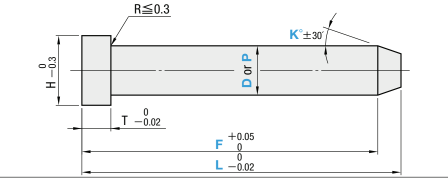
Shape G
(Cone)



K···0.5° increments
20≦K≦60
and
(L−ℓ)≧10

ℓ calculation formula
$\ell = \frac{(D \text{ or } P)}{2\tan K}$

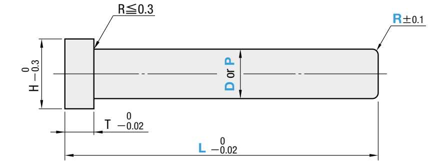
Shape T
(Tapered)



F···0.01mm increments
F≧12.00
and
$0.3 \leqq (L-F) \leqq \frac{L}{2}$
and
$\frac{(D \text{ or } P)}{2} - (L-F)\tan K \geqq 0.1$

K···1° increments
1≦K≦45

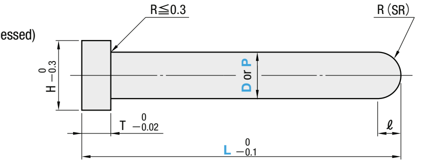
Shape R
(R chamfered)



When no R specified
R=0.4±0.1

R···0.1mm increments
$0.2 \leqq R \leqq \frac{(D \text{ or } P)-0.2}{2}$
and
L−R≧10

Shape B
(Spherical processed)



Fixed dimension for R
Spherical processed (SR)
$\{R(SR) = \frac{(D \text{ or } P)}{2}\}$

When RC code is used
RC=0.1mm increments
(D or P)/2≦RC≦3×(D or P)
(Shaft diameter designation)
{P<4 ···› P/2≦RC≦(1.5×P)}
However, RC≦32
and
L−ℓ≧10
ℓ calculation formula
$\ell = RC - \sqrt{RC^2 - \frac{(D^2 \text{ or } P^2)}{4}}$

Non JIS material definition is listed on P.1351 - 1352

■Shaft diameter (D) selection type

H	T	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	Shape (Tip size)	U/Price 1～4 C	G	T	R	B
8	6	CPDJL	C G T R B	4	30.00～120.00	Shape C C···0.1mm increments When no C specified C=0.4±0.1 Shape G K···0.5° increments Shape T F···0.01mm increments K···1° increments Shape R R···0.1mm increments When no R specified R=0.4±0.1 Refer to the working limits shown in the drawing.	Quotation				
				4.5							
9				5							
				5.5							
10				6							
11				6.5							
				7							
13	8			8							
15				10							

■Shaft diameter (P) designation type

H	T	Part Number Type	Part Number Shape	Part Number No.	L 0.01mm increments	P 0.01mm increments	Shape (Tip size)	U/Price 1～4 C	G	T	R	B
8	6	CPDJBL	C G T R B	4	30.00～120.00	3.50～ 3.99	Shape C C···0.1mm increments When no C specified C=0.4±0.1 Shape G K···0.5° increments Shape T F···0.01mm increments K···1° increments Shape R R···0.1mm increments When no R specified R=0.4±0.1 Refer to the working limits shown in the drawing.	Quotation				
9				5		4.00～ 4.99						
10				6		5.00～ 5.99						
13	8			8		6.00～ 7.99						
15				10		8.00～ 9.99						

Order

Part Number	—	L	—	P	—	Tip size (C·F·K·R)
CPDJBLT 5	—	32.58	—	P4.10	—	F21.06 — K1

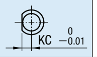
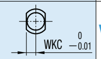
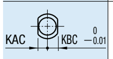
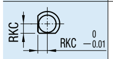
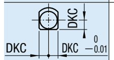
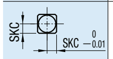
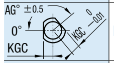
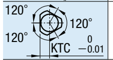
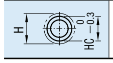
Days to Ship Quotation

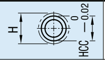
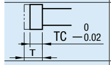
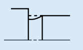
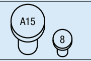
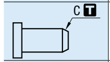
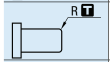
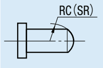
Price Quotation

Alterations

Part Number	—	L	—	P	—	Tip size C(CKC) · F · K · R(RTC)	—	(KC · WKC···etc.)
CPDJBLC 5	—	33.62	—	P4.10			—	CKC0.50

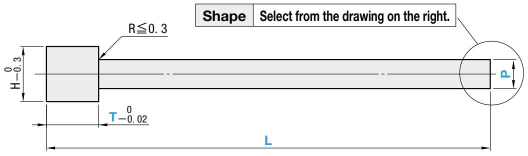
Alteration details P.395

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection 0.05mm increments possible Shaft diameter (P) designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting (D or P)/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2		Quotation
	DKC	Three flats cutting (D or P)/2≦DKC<H/2		
	SKC	Four flats cutting (D or P)/2≦SKC<H/2		
	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		

Alterations	Code	Spec.	1Code
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments T/2≦TC<T (Dimension L remains unchanged.) T−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 ⊗ Combination with SKC not available.	Quotation
	CKC	Improves C chamfering tolerance C±0.05 ···› ±0.02 0.1≦CKC≦(D or P−0.2)/2 L−CKC≧9.5 Available for Shape C only CKC=0.05mm increments	
	RTC	Improves tip R tolerance R±0.1 ···› ±0.05 0.2≦RTC≦(D or P−0.2)/2 L−RTC≧10 Available for Shape R only RTC=0.1mm increments	
	RC	Tip R alteration RC=0.1mm increments (D or P)/2<RC≦RCmax. and L−ℓ≧10 Shaft diameter (D or P)<4 ···› RCmax.=1.5×(D or P) Shaft diameter (D or P)≧4 ···› RCmax.=3×(D or P) However, RC≦32 Available for Shape B only	

FREE DESIGNATION STRAIGHT CORE PINS WITH TIP PROCESS

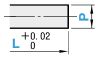
RoHS



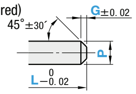
Type	Shape	M	H	T P
F−CPNE	S C G T R B	NAK80	37～43HRC	−0.01 −0.02
F−CPFE		DH2F	38～42HRC	
F−CPDE		SKD61 equivalent	48～52HRC	
F−CPHE		SKH51 equivalent	58～60HRC	
F−CPN		NAK80	37～43HRC	0 −0.005
F−CPF		DH2F	38～42HRC	
F−CPD		SKD61 equivalent	48～52HRC	
F−CPH		SKH51 equivalent	58～60HRC	

Shape (Tip shape)

S (Not processed)

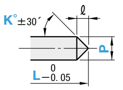


C (C chamfered)



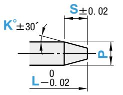
0.1≦G<P/2
0.05mm increme
G≦L−10

G (Cone)



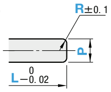
20≦K≦60
0.5° increments
$L-\frac{P}{2\tan K}\geqq 10$
$\ell=\frac{P}{2\tan K}$

T (Tapered)



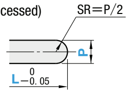
$0.1\leqq S<\frac{P}{2\tan K}$
$S\leqq L-10$ and $S\leqq\frac{L}{2}$
0.05mm increments
0<K≦45
0.5° increments

R (R chamfered)



0.2≦R<P/2
0.1mm increments
R≦L−10
The tip specified dimension Q has been changed to the specified dimension R.

B (Spherical processed)



$L-\frac{P}{2}\geqq 10$

H	Part Number			0.01mm increments		T
	Type	Shape	No.	L	P	0.1mm increments
5	F−CPNE F−CPFE F−CPDE F−CPHE F−CPN F−CPF F−CPD F−CPH	S C G T R B	5	12.00 ～ 100.00	2.00 ～ 3.00	1.5 ～ 20.0 T≦L−10
6			6		2.50 ～ 4.00	
7			7		3.00 ～ 5.00	
8			8		4.00 ～ 6.00	
9			9		4.00 ～ 7.00	
10			10		5.00 ～ 8.00	
11			11		6.00 ～ 9.00	
12			12		7.00 ～ 10.00	
13			13		8.00 ～ 11.00	
15			15		10.00 ～ 13.00	

Order

Part Number	—	L	—	P	—	T	—	Tip size (K・S・G・Q)
F−CPDS 6	—	61.00	—	P2.85	—	T19.0		

Days to Ship Quotation

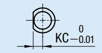
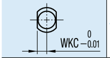
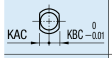
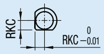
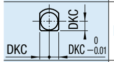
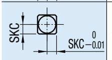
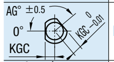
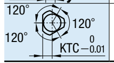
Non JIS material definition is listed on P.1351 - 1352

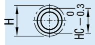
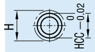
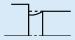
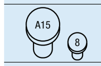
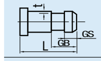
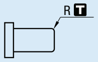
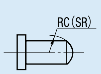
Price Quotation

Alterations

Part Number	—	L	—	P	—	T	—	Tip size (K・S・G・R(RTC))	—	(KC・WKC…etc.)
F−CPNS 8	—	30.2	—	P5.50	—	T19.0			—	HC6.5

Alteration details P.395

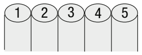
Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.396 ⊗ Combination with SKC not available.	
	GVC	Gas vent machining GS・GB=1mm increments 2+(G・ℓ・S・R・SR)≦GS≦12 GS+2≦GB≦30 L−T−GB≧10 How to order P.396	
	RTC	Improves tip R tolerance R±0.1 ⋯› ±0.05 RTC=0.1mm increments $0.2\leqq RTC\leqq\frac{P-0.2}{2}$ $L-RTC\geqq 10$ Available for $\frac{P-0.2}{2}$ R only	
	RC	Tip R alteration RC=0.1mm increments P/2<RC≦RCmax. and L−ℓ≧10 Shaft diameter P<4 ⋯› RCmax.=1.5×P Shaft diameter P≧4 ⋯› RCmax.=3×P However, RC≦32 Available for Shape B only ℓ calculation formula $\ell=RC-\sqrt{RC^2-\frac{P^2}{4}}$	

STRAIGHT CORE PINS WITH ENGRAVING

—CONCAVE CHARACTER TYPE—

P.433 The convenient "Sequential numbering designation" is now available for bulk order！！

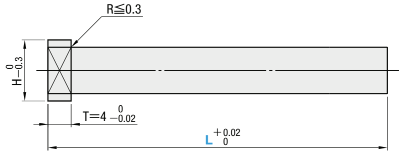


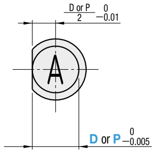
Non JIS material definition is listed on P.1351 - 1352

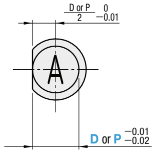
RoHS

Type	M	H HRC	T D or P	T L
CPH□M	SKH51 equivalent	58～60	0 −0.005	+0.02 0
CPHB□M				
CPX□M			−0.01 −0.02	
CPXB□M				

CPH□M (Shaft diameter (D) selection type) **CPX□M** (Shaft diameter (D) selection type)
CPHB□M (Shaft diameter (P) designation type) **CPXB□M** (Shaft diameter (P) designation type)

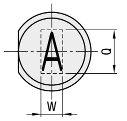






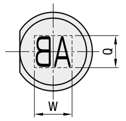
To decide the shape processing position, process a key flat cutting on the standard 0°.

1M (1 character)



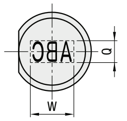
D or P	Q	W
0.60～ 0.79	0.4	0.2
0.80～ 0.99	0.6	0.3
1.00～ 1.29	0.8	0.4
1.30～ 1.49	1.0	0.5
1.50～ 1.99	1.2	0.6
2.00～ 2.49	1.5	0.8
2.50～ 3.49	2.0	1.0
3.50～ 4.49	3.0	1.5
4.50～ 5.49	3.5	2.0
5.50～10	4.5	2.5

2M (2 characters)



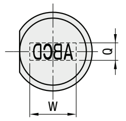
D or P	Q	W
1.00～ 1.19	0.5	0.7
1.20～ 1.39	0.6	0.8
1.40～ 1.59	0.7	0.9
1.60～ 1.79	0.7	1.0
1.80～ 1.99	0.8	1.1
2.00～ 2.29	0.8	1.2
2.30～ 2.99	1.0	1.3
3.00～ 3.99	1.5	2.0
4.00～ 4.99	2.0	2.6
5.00～ 5.99	2.5	3.3
6.00～ 7.99	3.0	3.9
8.00～10	4.0	5.2

3M (3 characters)



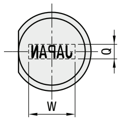
D or P	Q	W
1.50～ 1.69	0.6	1.0
1.70～ 1.99	0.6	1.2
2.00～ 2.39	0.7	1.4
2.40～ 2.79	0.8	1.7
2.80～ 3.09	0.8	1.8
3.10～ 4.49	1.0	2.1
4.50～ 5.49	1.5	3.2
5.50～ 6.99	2.0	4.2
7.00～10	2.5	5.3

4M (4 characters)



D or P	Q	W
1.80～ 1.89	0.5	1.2
1.90～ 2.19	0.5	1.4
2.20～ 2.49	0.6	1.6
2.50～ 2.79	0.6	1.8
2.80～ 3.09	0.7	2.0
3.10～ 3.59	0.8	2.2
3.60～ 3.89	0.8	2.4
3.90～ 5.49	1.0	2.9
5.50～ 6.99	1.5	4.4
7.00～10	2.0	5.8

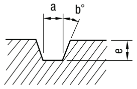
5M (5 characters)



D or P	Q	W
2.00～ 2.19	0.5	1.6
2.20～ 2.39	0.5	1.7
2.40～ 2.69	0.6	1.8
2.70～ 2.99	0.6	2.0
3.00～ 3.29	0.7	2.2
3.30～ 3.69	0.7	2.4
3.70～ 4.09	0.7	2.6
4.10～ 4.49	0.8	2.8
4.50～ 4.99	0.8	3.0
5.00～ 6.99	1.0	3.7
7.00～10	1.5	5.6

Core Pins	Finished products
Reverse character (Concave character)	Normal character (Convex embossed character)

Engraving Details drawing



Groove width(a)	(0.1×Q)±0.05
Drafts for pulling(b°)	30° ±2°
Groove depth(e)	0.05±0.02

P Price **Quotation**

■Shaft diameter (D) selection type

H	Part Number Type	Part Number Character	Part Number D	L 0.01mm increments
3	CPH (D $^{0}_{-0.005}$) CPX (D $^{-0.01}_{-0.02}$)	1M 2M 3M 4M 5M	0.6	10.00～100.00
			0.7	
			0.8	
			0.9	
			1	
			1.1	
			1.2	
			1.3	
			1.4	
4			1.5	
			1.6	
			1.7	
			1.8	
			1.9	
			2	
5			2.5	
6			3	
7			3.5	10.00～120.00
			4	
8			4.5	
			5	10.00～120.00 CPH□M only 10.00～150.00
			5.5	
9			6	
10			6.5	
			7	
11			8	
15			10	

Characters for engraving (Round Gothic type)

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z

Pay attention to the specification of Q・W, size of engraving character.(Details **Left page**)

Name	Slash	Greater	Less	Plus	Minus	Space
Characters for engraving	／	＞	＜	＋	－	⬚
Order code	¥	＞	＜	＋	＃	％

Name	Centered dot	Period
Characters for engraving	・	.
Order code	@	&

Please place order by the character order of molding products.

■Shaft diameter (P) designation 0.01mm increments type

H	Part Number Type	Part Number Character	Part Number No.	0.01mm increments L	0.01mm increments P
3	CPHB (P $^{0}_{-0.005}$) CPXB (P $^{-0.01}_{-0.02}$)	1M 2M 3M 4M 5M	0.8	10.00～100.00	0.60 ～ 0.79
			1		0.80 ～ 0.99
			1.5		1.00 ～ 1.49
4			2		1.50 ～ 1.99
5			2.5		2.00 ～ 2.49
6			3		2.50 ～ 2.99
7			3.5	10.00～120.00	3.00 ～ 3.49
			4		3.50 ～ 3.99
8			4.5		4.00 ～ 4.49
			5	10.00～120.00 CPHB□M only 10.00～150.00	4.50 ～ 4.99
9			5.5		5.00 ～ 5.49
			6		5.50 ～ 5.99
10			6.5		6.00 ～ 6.49
			7		6.50 ～ 6.99
11			8		7.00 ～ 7.99
15			10		8.00 ～ 9.99

Characters for engraving (Round Gothic type)

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z

Pay attention to the specification of Q・W, size of engraving character.(Details **Left page**)

Name	Slash	Greater	Less	Plus	Minus	Space
Characters for engraving	／	＞	＜	＋	－	⬚
Order code	¥	＞	＜	＋	＃	％

Name	Centered dot	Period
Characters for engraving	・	.
Order code	@	&

Please place order by the character order of molding products.

Order Part Number － L － P － Characters for engraving (0～9, A～Z ／＞＜＋－⬚・.)

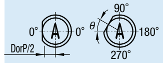
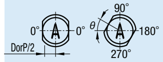
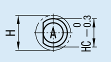
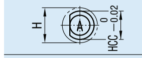
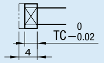
CPH4M6 － 35.00 － ＞PS＜
CPHB5M8 － 30.00 － P7.30 － ABC5Z

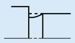
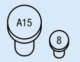
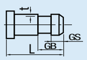
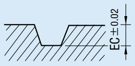
Days to Ship **Quotation**

Alterations Part Number － L － P － Characters for engraving (0～9, A～Z ／＞＜＋－⬚・.) － (AKC・AWC…etc.)

CPHB5M8 － 30.00 － P7.30 － ABC5Z － AWC60

Alteration details P.395

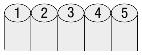
Alterations	Code	Spec.	1Code
	AKC	Head angle alteration AKC=1° increments 0＜AKC＜360	Quotation
	AWC	Head angle alteration (2 planes) AWC=1° increments 0≦AWC＜360	
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)＋0.5≦HCC＜H－0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC＜4 (Dimension L remains unchanged.) 4－TC≦Lmax.－L	

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	Quotation
	NHC	Numbering on the head How to order P.396 Available when H≧2	
	GVC	Gas vent machining GS・GB=1mm increments 2≦GS≦10 GS＋2≦GB≦30 L－GB≧10 Available when D or P≧2.00 How to order P.396	
	EC	Engraving depth alteration ・EC0.1 Engraving depth is changed from 0.05→0.1. ・EC0.2 Engraving depth is changed from 0.05→0.2. Refer to for shaft diameter selection range and character size (Q×P).	

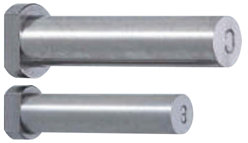
SEQUENTIAL NUMBERING DESIGNATION STRAIGHT CORE PINS WITH ENGRAVING

—CONCAVE CHARACTER TYPE—

Check In case of bulk order with the same size, the sequential numbering engraving is automatically performed.

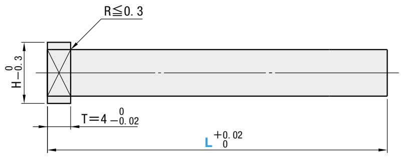


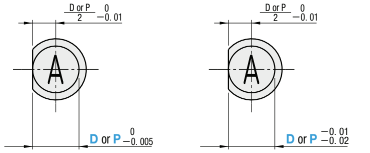
Non JIS material definition is listed on P.1351 - 1352



Type	M	H HRC	T D or P	T L
CPH1MR	SKH51 equivalent	58~60	0 −0.005	+0.02 0
CPHB1MR				
CPX1MR			−0.01 −0.02	
CPXB1MR				

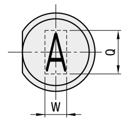
CPH□M (Shaft diameter (D) selection type) CPX□M (Shaft diameter (D) selection type)
CPHB□M (Shaft diameter (P) designation type) CPXB□M (Shaft diameter (P) designation type)




$\frac{D\ or\ P}{2}$ $^{0}_{-0.01}$
A
D or P $^{0}_{-0.005}$
$\frac{D\ or\ P}{2}$ $^{0}_{-0.01}$
A
D or P $^{-0.01}_{-0.02}$

To decide the shape processing position, process a key flat cutting on the standard 0° .

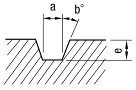
1MR (1 character)



D or P	Q	W
0.60~ 0.79	0.4	0.2
0.80~ 0.99	0.6	0.3
1.00~ 1.29	0.8	0.4
1.30~ 1.49	1.0	0.5
1.50~ 1.99	1.2	0.6
2.00~ 2.49	1.5	0.8
2.50~ 3.49	2.0	1.0
3.50~ 4.49	3.0	1.5
4.50~ 5.49	3.5	2.0
5.50~10	4.5	2.5

Core Pins	Finished products
Reversed reading (Concave character)	Normal character (Convex embossed character)

Engraving Details drawing



Groove width(a)	(0.1×Q)±0.05
Drafts for pulling(b°)	30° ±2°
Groove depth(e)	0.05±0.02

■Shaft diameter (D) selection type

H	Part Number Type	Part Number D	L 0.01mm increments	Characters for engraving (Round Gothic type)	U/Price 1~4
3	CPH1MR CPX1MR	0.6	10.00~100.00	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
		0.7			
		0.8			
		0.9			
		1			
		1.1			
		1.2			
		1.3			
		1.4			
		1.5			
4		1.6			
		1.7			
		1.8			
		1.9			
		2			
5		2.5			
6		3			
7		3.5	10.00~120.00		
		4			
8		4.5			
		5	10.00~120.00 CPH1MR only 10.00~150.00		
		5.5			
9		6			
10		6.5			
		7			
11		8			
15		10			

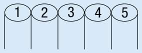
Refer to the following notes (on Shaft Diameter P Designation Type).

■Shaft diameter (P) designation 0.01mm increments type

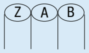
H	Part Number Type	Part Number No.	0.01mm increments L	0.01mm increments P	Characters for engraving (Round Gothic type)	U/Price 1~4
3	CPHB1MR CPXB1MR	0.8	10.00~100.00	0.60~0.79	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
		1		0.80~0.99		
		1.5		1.00~1.49		
4		2		1.50~1.99		
5		2.5		2.00~2.49		
6		3		2.50~2.99		
7		3.5	10.00~120.00	3.00~3.49		
		4		3.50~3.99		
8		4.5		4.00~4.49		
		5	10.00~120.00 CPHB1MR only 10.00~150.00	4.50~4.99		
9		5.5		5.00~5.49		
		6		5.50~5.99		
10		6.5		6.00~6.49		
		7		6.50~6.99		
11		8		7.00~7.99		
15		10		8.00~9.99		

In the case of bulk order of core pins with the same size, the sequential numbering engraving is automatically performed.
"0" is next to "9", while "A" is next to "Z".

- When placing the order for 5 pieces of CPHB1MR2—90.00—P1.60—1



- When placing the order for 3 pieces of CPH1MR4—100.00—Z



* "0" is next to "9", while "A" is next to "Z".

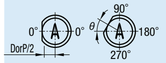
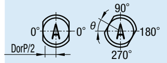
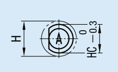
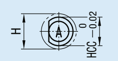
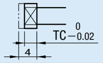
Order	Part Number	L	P	Characters for engraving (0~9, A~Z)
	CPH1MR6	35.00		1
	CPHB1MR8	30.00	P7.30	A

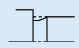
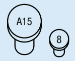
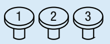
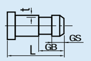
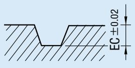
Days to Ship **Quotation**

Price **Quotation**

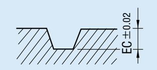
Alterations	Part Number	L	P	Characters for engraving (0~9, A~Z)	(AKC · AWC···etc.)
	CPHB1MR8	30.00	P7.30	A	AWC60

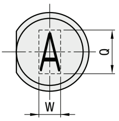
Alteration details P.395

Alterations	Code	Spec.	1Code
	AKC	Head angle alteration AKC=1° increments 0<AKC<360	Quotation
	AWC	Head angle alteration (2 planes) AWC=1° increments 0≦AWC<360	
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	Quotation
	NHC	Numbering on the head How to order P.396 Available when H≧2	
	NHN	Automatic sequential numbering on the head How to order P.396 Available when H≧2	
	GVC	Gas vent machining GS · GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 L−GB≧10 Available when D or P≧2.00 How to order P.396	
	EC	Engraving depth alteration EC0.1 Engraving depth is changed from 0.05 ···› 0.1 EC0.2 Engraving depth is changed from 0.05 ···› 0.2 Refer to the following table for shaft diameter selection range and character size (Q×P).	

■Straight Core Pins With Engraving —Concave Character Type— Alterations EC

	Code	Spec.	1Code
	EC	Engraving depth alteration EC0.1 Engraving depth is changed from 0.05 ···› 0.1 EC0.2 Engraving depth is changed from 0.05 ···› 0.2 Refer to the following table for shaft diameter selection range and character size (Q×P)	Quotation



Character size Possible range of designation

Alteration EC enables the engraving depth of concave character to be changed.
shaft diameter selection range and character size (Q×W) will be changed.

■Character size (Q×W) : EC0.1···›When changing engraving depth to 0.1mm

Part Number Type	Part Number D or P	Character size(Q×W) 1M · 1MR	2M	3M	4M	5M
CPH□ CPX□ CPHB□ CPXB□	0.60~0.69	–	–	–	–	–
	0.70~0.79					
	0.80~0.89	0.55×0.4				
	0.90~0.99	0.6 ×0.4				
	1.00~1.09	0.7 ×0.45				
	1.10~1.19	0.8 ×0.5				
	1.20~1.29	0.8 ×0.5	0.55×0.9			
	1.30~1.39	0.9 ×0.6	0.6 ×0.9			
	1.40~1.49	0.9 ×0.6	0.6 ×0.9			
	1.50~1.59	1.0 ×0.7	0.7 ×1.0			
	1.60~1.69	1.0 ×0.7	0.8 ×1.1			
	1.70~1.79	1.2 ×0.8	0.8 ×1.1			
	1.80~1.89	1.2 ×0.8	0.8 ×1.2	0.55×1.4		
	1.90~1.99	1.2 ×0.8	0.8 ×1.2	0.6 ×1.4		
	2.00~2.49	1.4 ×0.9	0.9 ×1.3	0.7 ×1.6		
	2.50~2.99	1.7 ×1.1	1.2 ×1.7	0.8 ×1.8	0.55 ×1.9	
	3.00~3.49	2.0 ×1.3	1.4 ×2.0	1.0 ×2.2	0.8 ×2.3	0.6×2.4
	3.50~3.99	2.4 ×1.65	1.7 ×2.4	1.2 ×2.6	1.0 ×2.7	0.8×2.9
	4.00~4.49	2.8 ×1.8	1.8 ×2.4	1.4 ×2.8	1.2 ×3.0	0.9×3.4
	4.50~4.99	3.2 ×2.0	2.0 ×3.2	1.6 ×3.2	1.4 ×3.4	1.0×3.6
	5.00~5.49	3.6 ×2.2	2.2 ×3.4	1.8 ×3.6	1.6 ×3.7	1.2×4.0
	5.50~5.99	4.0 ×2.4	2.4 ×3.8	2.0 ×4.0	1.8 ×4.0	1.4×4.4
	6.00~6.49	4.2 ×2.6	2.6 ×4.0	2.2 ×4.4	2.0 ×4.4	1.6×4.8
	6.50~6.99	4.5 ×2.8	2.8 ×4.2	2.4 ×4.8	2.2 ×4.8	1.8×5.2
	7.00~7.99	4.8 ×3.0	3.0 ×4.6	2.6 ×5.2	2.4 ×5.2	2.0×5.6
	8.00~9.99	5.4 ×3.4	3.5 ×5.2	3.0 ×6.0	2.8 ×6.0	2.2×6.4
	10.00	6.6 ×4.2	4.4 ×6.5	3.6 ×7.5	3.6 ×7.5	2.6×8.0

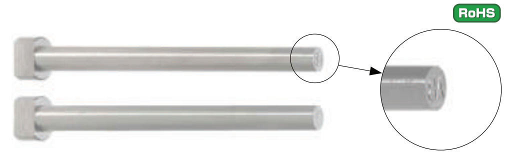
■Character size (Q×W) : EC0.2···›When changing engraving depth to 0.2mm

Part Number Type	Part Number D or P	Character size(Q×W) 1M · 1MR	2M	3M	4M	5M
CPH□ CPX□ CPHB□ CPXB□	0.60~0.69	–	–	–	–	–
	0.70~0.79					
	0.80~0.89					
	0.90~0.99					
	1.00~1.09					
	1.10~1.19					
	1.20~1.29					
	1.30~1.39					
	1.40~1.49					
	1.50~1.59					
	1.60~1.69					
	1.70~1.79					
	1.80~1.89					
	1.90~1.99					
	2.00~2.49	1.4×1.0				
	2.50~2.99	1.8×1.2				
	3.00~3.49	2.0×1.4	1.4×2.2			
	3.50~3.99	2.4×1.6	1.8×2.4			
	4.00~4.49	2.8×1.8	2.0×2.8	1.4×3.4		
	4.50~4.99	3.0×2.0	2.2×3.0	1.6×3.6		
	5.00~5.49	3.4×2.3	2.4×3.4	1.8×4.0		
	5.50~5.99	3.6×2.5	2.6×3.6	2.0×4.2	1.4×4.6	
	6.00~6.49	4.0×2.8	2.8×4.0	2.2×4.6	1.6×5.0	
	6.50~6.99	4.4×3.0	3.0×4.4	2.4×5.0	1.8×5.4	1.4×5.8
	7.00~7.99	4.8×3.2	3.2×4.8	2.6×5.4	2.0×5.8	1.6×6.2
	8.00~9.99	5.5×3.6	3.6×5.6	3.0×6.2	2.2×6.6	1.8×7.0
	10.00	6.8×4.5	4.5×7.0	3.6×7.6	2.8×8.2	2.2×8.6

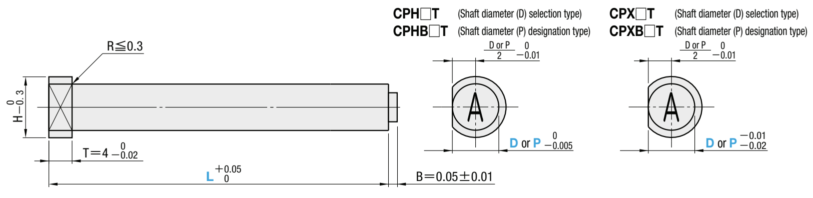
STRAIGHT CORE PINS WITH ENGRAVING

—CONVEX CHARACTER TYPE—

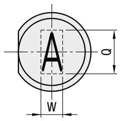
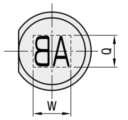
Non JIS material definition is listed on P.1351 - 1352



Type	M	H HRC	T D or P	T L
CPH□T	SKH51 equivalent	58～60	0 −0.005	+0.05 0
CPHB□T				
CPX□T			−0.01 −0.02	
CPXB□T				

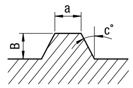

CPH□T (Shaft diameter (D) selection type)
CPHB□T (Shaft diameter (P) designation type)
CPX□T (Shaft diameter (D) selection type)
CPXB□T (Shaft diameter (P) designation type)
R≦0.3
H 0 −0.3
T=4 0 −0.02
L +0.05 0
B=0.05±0.01
D or P / 2 0 −0.01
D or P 0 −0.005
D or P / 2 0 −0.01
D or P −0.01 −0.02
A

To decide the shape processing position, process a key flat cutting on the standard 0° .

1T (1 character)	2T (2 characters)
	
1.00≦D or P≦4.00	2.00≦D or P≦4.00

Please place order by the character order of molding products.

Details of engraving



Core Pins	Finished products
Reversed reading (Convex character)	Normal character (Concave character)

Groove width (a)	0.03～0.1
Drafts for pulling (c°)	35° ±2°
Groove depth (B)	0.05±0.01

Relationship between Shaft Diameter (D or P) and Character Size (Q, W)

No. of characters	D or P	Q	W
1T (1 character)	1.00～1.29	0.6	0.5
	1.30～1.49	0.6	0.5
	1.50～1.99	0.9	0.7
	2.00～2.49	1.3	0.8
	2.50～2.99	1.6	1.0
	3.00～3.49	1.9	1.2
	3.50～3.99	2.3	1.4
	4.00	2.6	1.6
2T (2 characters)	2.00～2.49	1.0	1.4
	2.50～2.99	1.2	1.7
	3.00～3.49	1.5	2.1
	3.50～3.99	1.7	2.4
	4.00	2.0	2.8

Character font

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z

Price Quotation

Shaft diameter (D) selection type

H	Part Number Type	Part Number Character	D	L 0.01mm increments	Characters for engraving
3	CPH CPX	1T 2T	1	10.00～100.00	1 2 3 4 5 6 7 8 9 0 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
			1.1		
			1.2		
			1.3		
			1.4		
			1.5		
4			1.6		
			1.7		
			1.8		
			1.9		
			2		
5			2.5		
6			3		
7			3.5	10.00～120.00	Pay attention to the specification of Q・W, size of engraving character. (Details Left page)
			4		

Please place order by the character order of molding products.

Shaft diameter (P) designation 0.01mm increments type

H	Part Number Type	Part Number Character	No.	0.01mm increments L	0.01mm increments P	Characters for engraving
3	CPHB CPXB	1T 2T	1.5	10.00～100.00	1.00 ～ 1.49	1 2 3 4 5 6 7 8 9 0 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
4			2		1.50 ～ 1.99	
5			2.5		2.00 ～ 2.49	
6			3		2.50 ～ 2.99	
7			3.5	10.00～120.00	3.00 ～ 3.49	Pay attention to the specification of Q・W, size of engraving character. (Details Left page)
			4		3.50 ～ 3.99	

Please place order by the character order of molding products.

Order

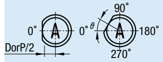
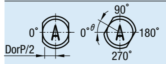
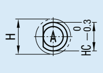
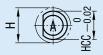
Part Number	—	L	—	P	—	Characters for engraving (1~0, A~Z)
CPH1T4	—	35.00			—	A
CPHB1T3	—	30.00		P2.80	—	A

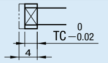
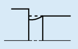
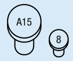
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	Characters for engraving (1~0, A~Z)	—	(AKC・AWC···etc.)
CPHB2T3	—	30.00	—	P2.80		AB	—	AWC60

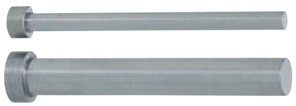
Alteration details P.395

Alterations	Code	Spec.	1Code
	AKC	Head angle alteration AKC=1° increments 0<AKC<360 No need to designate AKC0	Quotation
	AWC	Head angle alteration (2 planes) AWC=1° increments 0≦AWC<360	
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	

Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	Quotation
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.396 Available when H≧2	

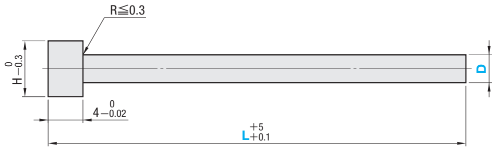
CORE PIN BLANKS

Non JIS material definition is listed on P.1351 - 1352



RoHS

Part Number	M	H	T D
CPD	SKD61 equivalent	48～52HRC	$^{-0.01}_{-0.02}$
CPH	SKH51 equivalent	58～60HRC	$^{0}_{-0.005}$



H	Part Number		L
	Type	D	
3	**CPD** (SKD61 equivalent) **CPH** (SKH51 equivalent)	1	60 100
		1.1	
		1.2	
		1.3	
		1.4	
		1.5	
4		1.6	
		1.7	
		1.8	
		1.9	
		2	
5		2.5	
6		3	
7		3.5	
		4	
8		4.5	
		5	
9		5.5	
		6	
10		6.5	
		7	
11		8	
15		10	
18		13	

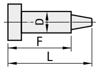
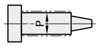
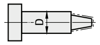
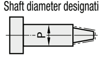
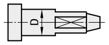
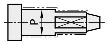
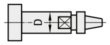
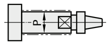
	Part Number	—	L
Order	CPD6	—	60

Days to Ship	Quotation
Price	Quotation

STEPS-TYPE ROUND CORE PINS

One-step Core Pins

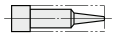
Minimum (ℓ) =0.3 is available for the short tip (ℓ) type, depending on the shape you select. For details, refer to each page.

Type	Group	Head thickness (T)	T			M								Page
			Shaft diameter (D or P)	Tip part (A,V)	Length (L,F)	SKH51 equivalent	SKD61 equivalent	NAK80	DH2F	STAVAX ESR® Hardening steel	PROVA400 Hardening steel	SUS440C	MAS1C	
One-step Core Pins Shaft diameter selection 	Extra precision	4mm (T4)	0 −0.003	±0.005	+0.01 0	CPM−1□□	—	—	—	—	—	—	—	P.455
						Tip short S−CPM−1□□	—	—	—	—	—	—	—	P.459
	Precision		0 −0.005	±0.005	+0.01 0	CPV−1□□	CPZ−1□□	—	—	—	—	—	—	P.449
						Tip short S−CPV−1□□	Tip short S−CPZ−1□□	—	—	—	—	—	—	P.453
	Standard		0 −0.005	±0.01	+0.02 0	CPH−1□□	CPP−1□□	CPK−1□□	CPG−1□□	CPEH−1□□	CPRH−1□□	CPW−1□□	CPY−1□□	P.443
						Tip short S−CPH−1□□	Tip short S−CPP−1□□	—	—	—	—	—	—	P.447
			−0.01 −0.02	±0.015		CPX−1□□	CPD−1□□	CPN−1□□	CPF−1□□	CPTH−1□□	CPQH−1□□	—	CPA−1□□	P.443
						Tip short S−CPX−1□□	Tip short S−CPD−1□□	—	—	—	—	—	—	P.447
		6・8mm (JIS)	−0.01 −0.02	±0.015		—	CPDJ−1□□	—	—	—	—	—	—	P.475
One-step Core Pins Shaft diameter designation 	Extra precision	4mm (T4)	0 −0.003	±0.005	+0.01 0	CPMB−1□□	—	—	—	—	—	—	—	P.457
						Tip short S−CPMB−1□□	—	—	—	—	—	—	—	P.459
	Precision		0 −0.005	±0.005	+0.01 0	CPVB−1□□	CPZB−1□□	—	—	—	—	—	—	P.451
						Tip short S−CPVB−1□□	Tip short S−CPZB−1□□	—	—	—	—	—	—	P.453
	Standard		0 −0.005	±0.01	+0.02 0	CPHB−1□□	CPPB−1□□	CPKB−1□□	CPGB−1□□	CPEHB−1□□	CPRHB−1□□	CPWB−1□□	CPYB−1□□	P.445
						Tip short S−CPHB−1□□	Tip short S−CPPB−1□□	—	—	—	—	—	—	P.447
			−0.01 −0.02	±0.015		CPXB−1□□	CPDB−1□□	CPNB−1□□	CPFB−1□□	CPTHB−1□□	CPQHB−1□□	—	CPAB−1□□	P.445
						Tip short S−CPXB−1□□	Tip short S−CPDB−1□□	—	—	—	—	—	—	P.447
						—	TiCN coating H−CPDB1□□	—	—	—	—	—	—	P.447 P.477
		6・8mm (JIS)	−0.01 −0.02	±0.015		—	CPDJB−1□□	—	—	—	—	—	—	P.475
One-step Core Pins -Lapped Type- Shaft diameter selection 	Standard	4mm (T4)	0 −0.005	±0.01	+0.02 0	L−CPH−1□□	—	—	—	—	—	—	—	P.461
			−0.01 −0.02	±0.015		—	L−CPD−1□□	—	—	—	—	—	—	P.461
One-step Core Pins -Lapped Type- Shaft diameter designation 	Standard	4mm (T4)	0 −0.005	±0.01	+0.02 0	L−CPHB−1□□	—	—	—	—	—	—	—	P.463
			−0.01 −0.02	±0.015		—	L−CPDB−1□□	—	—	—	—	—	—	P.463
Gas Release One-step Core Pins Shaft diameter selection • Cutting facets 	Precision	4mm (T4)	0 −0.005	±0.005	+0.01 0	GW□−CPV−1□□	—	—	—	—	—	—	—	P.465
	Standard		0 −0.005	±0.01	+0.02 0	GW□−CPH−1□□	—	—	—	—	—	—	—	P.465
			−0.01 −0.02	±0.015		GW□−CPX−1□□	—	—	—	—	—	—	—	P.465
Gas Release One-step Core Pins Shaft diameter designation • Cutting facets 	Precision	4mm (T4)	0 −0.005	±0.005	+0.01 0	GW□−CPVB−1□□	—	—	—	—	—	—	—	P.465
	Standard		0 −0.005	±0.01	+0.02 0	GW□−CPHB−1□□	—	—	—	—	—	—	—	P.465
			−0.01 −0.02	±0.015		GW□−CPXB−1□□	—	—	—	—	—	—	—	P.465
Gas Release One-step Core Pins Gas Release One-step Core Pins • Shaft diameter selection 	Extra precision	4mm (T4)	0 −0.003	±0.005	+0.01 0	GV−CPM−1□□	—	—	—	—	—	—	—	P.473
	Precision		0 −0.005	±0.005	+0.01 0	GV−CPV−1□□	GV−CPZ−1□□	—	—	—	—	—	—	P.471
	Standard		0 −0.005	±0.01	+0.02 0	GV−CPH−1□□	GV−CPP−1□□	GV−CPK−1□□	GV−CPG−1□□	—	—	—	—	P.467
			−0.01 −0.02	±0.015		GV−CPX−1□□	GV−CPD−1□□	GV−CPN−1□□	GV−CPF−1□□	—	—	—	—	P.467
Gas Release One-step Core Pins Shaft diameter designation • Gas vent 	Extra precision	4mm (T4)	0 −0.003	±0.005	+0.01 0	GV−CPMB−1□□	—	—	—	—	—	—	—	P.473
	Precision		0 −0.005	±0.005	+0.01 0	GV−CPVB−1□□	GV−CPZB−1□□	—	—	—	—	—	—	P.471
	Standard		0 −0.005	±0.01	+0.02 0	GV−CPHB−1□□	GV−CPPB−1□□	GV−CPKB−1□□	GV−CPGB−1□□	—	—	—	—	P.469
			−0.01 −0.02	±0.015		GV−CPXB−1□□	GV−CPDB−1□□	GV−CPNB−1□□	GV−CPFB−1□□	—	—	—	—	P.469

Tip tolerance values of tip (A, V) and length (L, F) are for reference only. The tolerance range varies depending on the shape selected. For details, refer to the Catalog page for each product.

"PROVA400 Hardening steel" and "MAS1C" will be discontinued when stocked materials are finished.

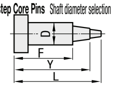
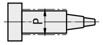
Free Designation One-step Core Pins (TiCN coating)

Type	T			M			Page
	Shaft diameter (D or P)	Tip part (A,V)	Length (L,F)	SKH51 equivalent	SKD61 equivalent	SKD61 equivalent (TiCN coating)	
Free Designation One-step Core Pins 	0 −0.005	±0.01	+0.02 0	F−CPHB1□□	—	—	P.479
	−0.01 −0.02	*±0.015	+0.02 0	—	F−CPDB1□□	HF−CPDB1□□	P.479

Tip tolerance values of tip (A, V) and length (L, F) are for reference only. The tolerance range varies depending on the shape selected. For details, refer to the Catalog page for each product. TiCN coating is A±0.02, V±0.02.

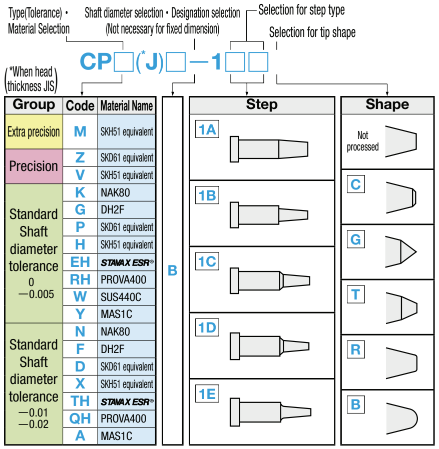
Two-step Core Pins

Minimum (ℓ) =0.6 is available for the short tip (ℓ) type, depending on the shape you select. For details, refer to each page.

Type	Group	T			M						Page
		Shaft diameter (D or P)	Tip part (A,V,J,E)	Length (L,Y,F)	SKH51 equivalent	SKD61 equivalent	NAK80	DH2F	SUS440C	MAS1C	
Two-step Core Pins Shaft diameter selection 	Precision	0 −0.005	±0.005	+0.01 0	C□V□	C□Z□	—	—	—	—	P.489
	Standard	0 −0.005	±0.01	+0.02 0	C□H□	C□P□	C□K□	C□G□	C□W□	C□Y□	P.483
		−0.01 −0.02	±0.015		C□X□	C□D□	C□N□	C□F□	—	C□A□	P.481
Two-step Core Pins Shaft diameter designation 	Precision	0 −0.005	±0.005	+0.01 0	C□VB□	C□ZB□	—	—	—	—	P.491
	Standard	0 −0.005	±0.01	+0.02 0	C□HB□	C□PB□	C□KB□	C□GB□	C□WB□	C□YB□	P.487
		−0.01 −0.02	±0.015		C□XB□	C□DB□	C□NB□	C□FB□	—	C□AB□	P.485

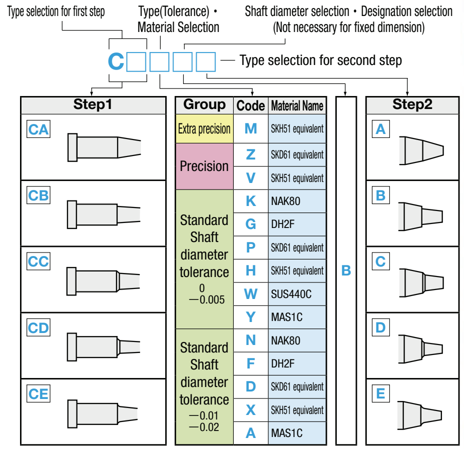
Tip tolerance values of tip (A, V, J, E) and length (L, Y, F) are for reference only. The tolerance range varies depending on the shape selected. For details, refer to the Catalog page for each product.

■Selection method for one-step core pins


Type(Tolerance) • Material Selection
Shaft diameter selection • Designation selection (Not necessary for fixed dimension)
Selection for step type
Selection for tip shape
CP□(*J)□−1□□
(*When head thickness JIS)
B
Step
1A
1B
1C
1D
1E
Shape
Not processed
C
G
T
R
B

Group	Code	Material Name
Extra precision	M	SKH51 equivalent
Precision	Z	SKD61 equivalent
	V	SKH51 equivalent
Standard Shaft diameter tolerance 0 −0.005	K	NAK80
	G	DH2F
	P	SKD61 equivalent
	H	SKH51 equivalent
	EH	STAVAX ESR®
	RH	PROVA400
	W	SUS440C
	Y	MAS1C
Standard Shaft diameter tolerance −0.01 −0.02	N	NAK80
	F	DH2F
	D	SKD61 equivalent
	X	SKH51 equivalent
	TH	STAVAX ESR®
	QH	PROVA400
	A	MAS1C

■Selection method for two-step core pins


Type selection for first step
Type(Tolerance) • Material Selection
Shaft diameter selection • Designation selection (Not necessary for fixed dimension)
C□□□□
Type selection for second step
Step1
CA
CB
CC
CD
CE
B
Step2
A
B
C
D
E

Group	Code	Material Name
Extra precision	M	SKH51 equivalent
Precision	Z	SKD61 equivalent
	V	SKH51 equivalent
Standard Shaft diameter tolerance 0 −0.005	K	NAK80
	G	DH2F
	P	SKD61 equivalent
	H	SKH51 equivalent
	W	SUS440C
	Y	MAS1C
Standard Shaft diameter tolerance −0.01 −0.02	N	NAK80
	F	DH2F
	D	SKD61 equivalent
	X	SKH51 equivalent
	A	MAS1C

■Material Characteristics of Steps-type Round Core Pins

Use these data for reference only as they are dependent on specific heat treatment and usage conditions. PROVA400 is equivalent to SUS420J2 upgrading steel from Fujikoshi. CO.

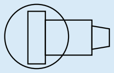
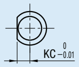
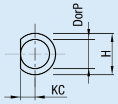
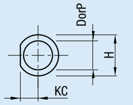
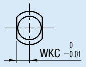
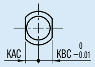
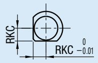
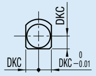
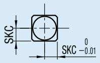
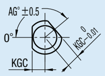
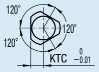
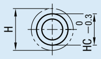
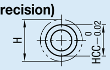
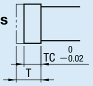
M		SKH51 (M2)(1.3343) High speed tool steel	SKD61 (H13)(1.2344) Thermal die steel	NAK80 (P21 group) (Ni-Cr-Mo-Steel)	DH2F (M13 group) (1.2344 group)	STAVAX ESR® Hardening steel	PROVA400 Hardening steel	SUS440C (S44004) (1.4125)	MAS1C Maraging steel
	H HRC	58～60	48～52	37～43	38～42	50～54	50～54	56～60	50～54
Machining characteristics	Abrasion resistance	5	3.5	2	3	4	4	4	3.5
	Ability to be mirror-finished	4	4	5	3	5	5	4	5
	Toughness	3	5	1	4	5	5	3	5
	Corrosion resistance	3	3	3	3	5	5	5	3
Physical characteristics	Watt density [g/cm³]	8.2	7.75	7.8	7.75	7.8	7.8	7.78	8.02
	Modulus of longitudinal elasticity [kg/mm²]	22300	21000	20500	21000	20400	21900	20400	18600
	Coefficient of thermal expansion [×10⁻⁶/℃]	10.1	10.8	12.5	10.8	11.0	10.9	10.2	10.1
	Thermal conductivity coefficient [cal/cm・sec・℃]	0.0509	0.061	0.1	0.061	0.055	0.058	0.058	—
Mechanical characteristics	Tensile strength [kgf/mm²]	235	135	128	135	196	200	205	215
	Charpy impact values [kgf・m/cm²]	2	6	2.2	4	—	—	1.5	5

Machining characteristics Poor 1 ⟷ 5 Excellent **Conversion formula** 1kgf/mm²=9.81N/mm² 1cal/cm・sec・℃=418.6W/M.K 1kgf・m/cm²=9.81J/cm²

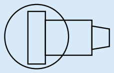
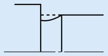
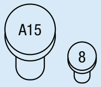
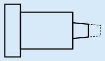
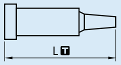
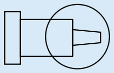
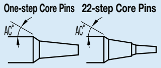
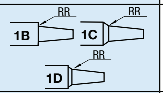
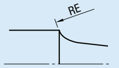
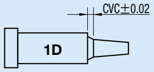
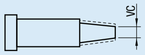
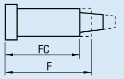
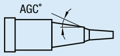
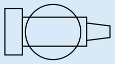
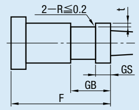
ALTERATION GUIDE FOR STEPS-TYPE ROUND CORE PINS

ⓘ Non JIS material definition is listed on P.1351 - 1352

■Alteration Guide for Steps-type Round Core Pins

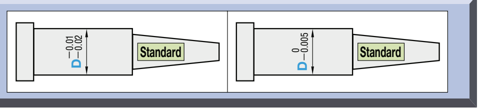
Items	Applicable Products	Alterations	Code	Specifications	1 Code
 **Head alteration**	**Common**	**Key flat cutting** 	KC	Single flat cutting Range of designation (DorP)/2≦KC＜H/2 When the key flat size is (shaft diameter/2)  Unit of designation Shaft diameter selection type ··············· 0.05mm increments possible Shaft diameter designation(0.01mm increments)type ·············· 0.005mm increments possible Shaft diameter designation(0.005mm increments)type ············ 0.0025mm increments possible Shaft diameter designation(0.001mm increments)type ············ 0.0005mm increments possible Designation method · KC2.61 (When P5.22) · WKC3.0875 (When P6.175) · RKC2.7425 (When P5.485) · DKC3 (When D6) · SKC2.5 (When D5) · KGC1.5－AG125 (When D3) · KTC3.085 (When P6.17) To designate an arbitrary flat size  Unit of designation 0.1mm increments Designation method · KC1.4 · WKC2.3 · KAC1.4－KBC1.6 · RKC1.4 · DKC1.75 · SKC5.8 · KGC1.4－AG85 · KTC2.3	Quotation
		Key flat cutting 	WKC	Two flats cutting Range of designation (DorP)/2≦WKC＜H/2	
		Key flat cutting 	KAC KBC	Varied width parallel flats cutting Range of designation (DorP)/2≦KAC KAC＜KBC＜H/2	
		Key flat cutting 	RKC	Two flats (right angled) cutting Range of designation (DorP)/2≦RKC＜H/2	
		Key flat cutting 	DKC	Three flats cutting Range of designation (DorP)/2≦DKC＜H/2	
		Key flat cutting 	SKC	Four flats cutting Range of designation (DorP)/2≦SKC＜H/2	
		Key flat cutting (angled) 	KGC	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation (DorP)/2≦KGC＜H/2 0＜AG＜360 AG＝1° increments	
		Key flat cutting (angled) 	KTC	Three flats cutting at 120° Range of designation (DorP)/2≦KTC＜H/2	
		Head diameter change 	HC	Reduces head diameter. Range of designation (DorP)≦HC＜H Unit of designation 0.1mm increments Designation method HC6.5 ⓘ In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
		Head diameter change (precision) 	HCC	Reduces head diameter. Range of designation (DorP)＋0.5≦HCC＜H－0.3 Unit of designation 0.1mm increments Designation method HCC6.1	
		Head thickness change 	TC	Reduces the head thickness. Range of designation 1.5≦TC＜T Unit of designation 0.1mm increments Designation method TC3.5 ⓘ Dimensions L, Y, and F remain unchanged.	

■Alteration Guide for Steps-type Round Core Pins

<table>
<tr><th>Items</th><th>Applicable Products</th><th>Alterations</th><th>Code</th><th>Specifications</th><th>1 Code</th></tr>
<tr><td>
Head alteration</td><td>Common</td><td>Relief under the head
</td><td>TRN</td><td>Adds a relief under the head, making plate chamfering unnecessary.
Designation method TRN</td><td>Quotation</td></tr>
<tr><td></td><td></td><td>Numbering on the head
 </td><td>NHC</td><td>Electrolytic marking of ID code on the head(in 5 point, Round Gothic type).
Available characters Numerals: 0～9; Alphabets: A～Z
Range of designation 1 character when 2≦H≦4.9
1 or 2 characters when 5≦H≦6.9(Only the first character may be an alphabet.)
Up to 3 characters when 7≦H(Only the first character may be an alphabet.)
ⓘ Note that depending upon the specified characters, if the space indicated in the table below does not exist on the head, it may not be possible to carry out numbering machining.
Unit: mm
<table>
<tr><th></th><th>Character Height</th><th>Character Width</th></tr>
<tr><td>1-character</td><td>2.3</td><td>2.7</td></tr>
<tr><td>2-character</td><td>2.3</td><td>5.0</td></tr>
<tr><td>3-character</td><td>2.3</td><td>7.3</td></tr>
</table>
Designation method NHC－6, NHC－23, NHC－A90
⊗ Combination with SKC not available. ⓘ Available when head diameter H≧2
⊗ NHC is not available when numbering space in head exceeds the maximum of 1.8 long x 1.8 wide x characters.</td><td></td></tr>
<tr><td>
Full length alteration</td><td>Extra precision
One-step Core Pins</td><td> </td><td>LKC</td><td>L dimension tolerance $^{+0.01}_{0}$ can be changed to $^{+0.005}_{0}$.
Unit of designation L designation in 0.005mm increments possible ⓘ Available when 1.500≦(DorP)≦5.000
Designation method LKC
ⓘ No Shape machining Available for C/T/R ⊗ Combination with FC not available.</td><td></td></tr>
<tr><td>
Shape alteration</td><td>Common</td><td> </td><td>AC</td><td>Changes the standard angle(Ks＝45°)
Range of designation 30≦AC≦60
Unit of designation 1° increments
Designation method AC40
ⓘ Available for round core pins Step 1C/1D
ⓘ Available for two-step round core pins Step1 CC/CD
ⓘ When Step 1D and Step1 CD are selected, A＋2(C×tanAC°)＜DorP
ⓘ When Step 1D, C≦1.0
⊗ Combination with CVC not available.</td><td></td></tr>
<tr><td></td><td>Standard
One-step Core Pins</td><td> </td><td>RR</td><td>Changes R (normally 0.2 or less) to R0.3～0.5. (Improves strength)
Designation method RR
ⓘ (DorP)－A≧1.0
ⓘ Available for Step 1B/1C/1D</td><td></td></tr>
<tr><td></td><td></td><td> </td><td>RE</td><td>R shape alteration (enlargement)
Range of designation 0.5≦RE≦2.0
Unit of designation 0.5mm increments ⓘ F tolerance is $^{+0.05}_{0}$
Designation method RE1.0 ⓘ Available for Step 1E</td><td></td></tr>
<tr><td></td><td>One-step Core Pins</td><td> </td><td>CVC</td><td>C dimension can be designated at 0.01mm increments.
Range of designation Standard: 0.50≦CVC≦1.00
Precision/Extra precision:0.10≦CVC≦1.00, CVC＜[(DorP)－A]/2
Unit of designation 0.01mm increments ⓘ Available for Step 1D
Designation method CVC0.15 ⊗ Combination with AC not available.</td><td></td></tr>
<tr><td></td><td></td><td>V dimension alteration
 </td><td>VC</td><td>Enlarges working limits for V min
<table>
<tr><th>D(No.)</th><th>Vmin.</th><th>VCmin.</th></tr>
<tr><td>1～1.5</td><td>0.50</td><td>0.40</td></tr>
<tr><td>3.5～4</td><td>1.00</td><td>0.70</td></tr>
<tr><td>5.5</td><td>1.50</td><td>1.00</td></tr>
<tr><td>6～10</td><td>2.00</td><td>1.50</td></tr>
<tr><td>20</td><td>5.00</td><td>4.00</td></tr>
</table>
⊗ Regarding D (No.)＝2～3, 4.5, 5 and 13～16, V min. is the machining limit, and VC cannot be used.
Unit of designation Standard: 0.01mm increments
Precision: 0.01mm increments
Extra precision: 0.005mm increments
Designation method VC0.56
ⓘ ℓ≦A×5,ℓ≦50 (For Step 1A, A ···› DorP)
ⓘ When Lapped type, refer to the Catalog page for each product.</td><td></td></tr>
<tr><td></td><td>Precision
Extra precision
One-step/Two-step Core Pins</td><td> </td><td>FC</td><td>F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too.
Range of designation 5.00≦FC＜Fmin.
Unit of designation 0.01mm increments
Designation method FC5.00 ⓘ When FC code is used, it can be designated up to Lmin.＝6.5mm.</td><td></td></tr>
<tr><td></td><td>Standard
Precision
Two-step Core Pins</td><td> </td><td>AGC</td><td>Changes the standard angle (Z＝45°).
Range of designation 30≦AGC≦60
Unit of designation 1° increments ⓘ Available for Step2 CC, CD
Designation method AGC55 ⓘ When Step2 CD, J＋2(G×tanAGC°)＜V</td><td></td></tr>
<tr><td>
Shaft alteration</td><td>Common</td><td>Vent machining
 </td><td>GVC</td><td>Gas vent machining
Range of designation 2≦GS≦10, GS＋2≦GB≦30
Unit of designation 1mm increments
Designation method GVC－GS3－GB20
ⓘ Available when Fmin.≦F－GB, DorP≧2.00
ⓘ For details of a Gas Release Core Pin, which is a product similar to alteration GVC, P.467～474
<table>
<tr><th>D or P</th><th>t</th></tr>
<tr><td>2.00～ 4.99</td><td>0.1</td></tr>
<tr><td>5.00～ 9.99</td><td>0.2</td></tr>
<tr><td>10.00～20.00</td><td>0.3</td></tr>
</table></td><td></td></tr>
</table>

ONE-STEP CORE PINS

— SHAFT DIAMETER (D) SELECTION • SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ ／ $^{0}_{-0.005}$ TYPE —



When exceeds the working limit of tip (ℓ) dimension (Refer to the step drawing lower right) ···➝ "Details of the tip (ℓ) short type "Details P.447

Non JIS material definition is listed on P.1351 - 1352

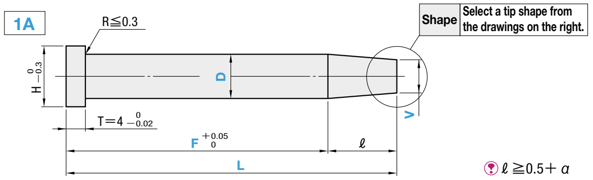
STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.

PROVA400 is equivalent to SUS420J2 upgrading steel from Fujikoshi. Features P.405

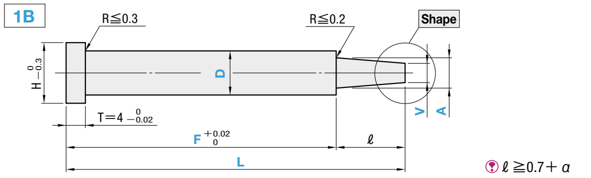
M	H	Type		Step	Shape
		Shaft diameter tolerance D $^{-0.01}_{-0.02}$ V · A tolerance ±0.015	Shaft diameter tolerance D $^{0}_{-0.005}$ V · A tolerance ±0.01		
NAK80	37〜43HRC	CPN—	CPK—	1A 1B 1C 1D 1E	Not processed C G T R B
DH2F	38〜42HRC	CPF—	CPG—		
SKD61 equivalent	48〜52HRC	CPD—	CPP—		
SKH51 equivalent	58〜60HRC	CPX—	CPH—		
SUS440C	56〜60HRC	—	CPW—		
MAS1C	50〜54HRC	CPA—	CPY—		
STAVAX ESR®	50〜54HRC	CPTH—	CPEH—		
PROVA400	50〜54HRC	CPQH—	CPRH—		

When Step 1E, A tolerance is±0.02.

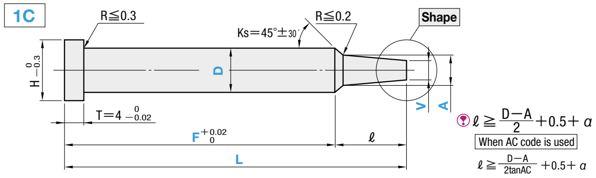
Step type selected from 1A〜1E below



$\ell \geqq 0.5+\alpha$



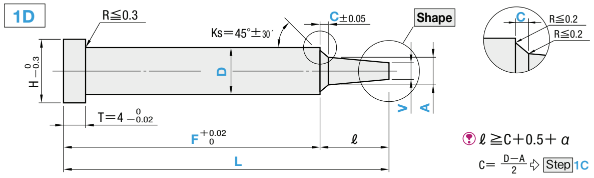
$\ell \geqq 0.7+\alpha$



$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

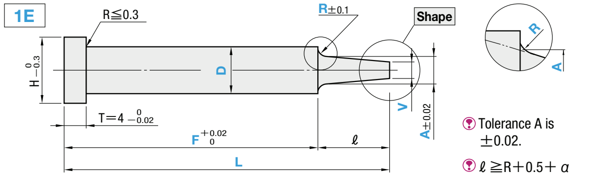
When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$



$\ell \geqq C+0.5+\alpha$

$C=\frac{D-A}{2}$ ⇨ Step 1C



Tolerance A is ±0.02.

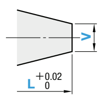
$\ell \geqq R+0.5+\alpha$

Refer to the Shape drawing for L tolerance

"PROVA400" and "MAS1C" will be discontinued when stocked materials are finished.

Shape (Tip shape: V is dimension before tip processing.)

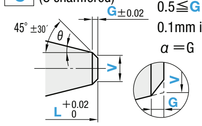
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

$\alpha=0$

C (C chamfered)

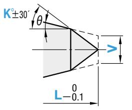


$0.5 \leqq G < V/2$

0.1mm increments

$\alpha=G \quad \theta<45°$

G (Cone)

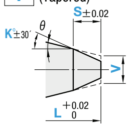


$20 < K \leqq 60$

1° increments

$\alpha=\frac{V}{2\tan K} \quad \theta<K$

T (Tapered)



$0.1 \leqq S < \frac{V}{2\tan K}$

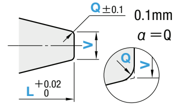
0.1mm increments

$10 \leqq K \leqq 45$

1° increments

$\alpha=S \quad \theta<K$

R (R chamfered)

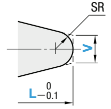


$0.2 \leqq Q < V/2$

0.1mm increments

$\alpha=Q$

B (Spherical processed)



$\alpha=V/2$

(Calculation of tip gradient θ P.1315)

H	Part Number					0.01mm increments						0.1mm increments		ℓmax.
	Type		Step	Shape	D	L min.	L max.	F min.	F max.	A	Vmin.	C	R	
3	Shaft diameter tolerance $^{-0.01}_{-0.02}$	Shaft diameter tolerance $^{0}_{-0.005}$			1	12.00	100.00	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{D-A}{2}$ and R≧0.2	15.00
					1.5									20.00
4	CPN— (1≦D≦16)	CPK— (1≦D≦16)		Designation is unnecessary when tip processing is not required.	2									25.00
5			1A		2.5									30.00
6	CPF— (1≦D≦16)	CPG— (1≦D≦16)			3						0.70			35.00
7					3.5		120.00				1.00			40.00
	CPD— (1≦D≦20)	CPP— (1≦D≦20)	1B		4									45.00
8					4.5									50.00
	CPX— (1≦D≦20)	CPH— (1≦D≦20)		C	5		120.00 Only CPH— 150.00							
9			1C		5.5						1.50			
		CPW— (1≦D≦16)		G	6						2.00			
10			1D	T	6.5									
	CPA— (1≦D≦4)	CPY— (1≦D≦4)			7									
11				R	8									
15	CPTH— (3≦D≦16)	CPEH— (3≦D≦16)	1E		10									
18				B	13									
21	CPQH— (1≦D≦16)	CPRH— (1≦D≦16)			16									
25					20	30.00		28.00			5.00			

Order

Part Number — L — F — A — V — C · R — Tip size (K · S · G · Q)
CPF—1BR6 — 46.00 — F38.00 — A5.00 — V3.00 — Q1.0
CPX—1DG6 — 50.00 — F40.00 — A5.10 — V3.00 — C0.3 — K40
CPW—1ET4 — 42.00 — F35.00 — A3.20 — V3.10 — R0.4 — K35 — S1.0

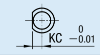
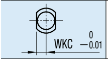
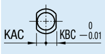
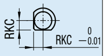
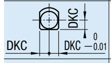
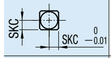
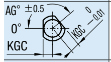
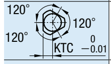
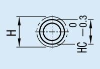
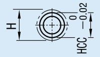
Days to Ship Quotation

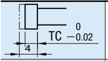
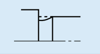
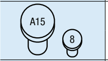
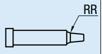
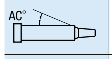
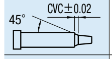
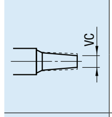
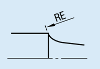
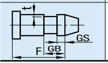
Price Quotation

Alterations

Part Number — L — F — A — V(VC) — C(CVC) — R(RE) — Tip size (K·S·G·Q) — (KC · WKC···etc.)
CPX—1EC6 — 50.00 — F40.00 — A5.00 — V3.10 — RE1.5 — G1.0 — HC8.0
CPP—1A 5 — 58.00 — F50.00 — V4.00 — NHC—23

Alteration details P.441

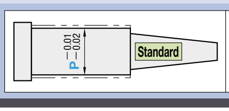
Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	Quotation
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	

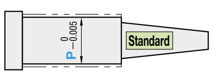
Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.442 Available when H≧2 ⊗ Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3〜0.5. (Strength has been improved) Designation method RR Step Available for 1B/1C/1D D−A≧1.0 Step When 1D,C≧0.5	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC • RR not available When Step 1D, C≦1.0,A+2(C×tanAC)<D	Quotation
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(D−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5, ℓ≦50 (D×5 for Step 1A) D>A≧VC D Vmin. VCmin. 1〜1.5 0.50 0.40 3.5〜4 1.00 0.70 5.5 1.50 1.00 6〜10 2.00 1.50 20 5.00 4.00 ⊗ Regarding No.=2〜3, 4.5, 5 and 13〜16, Vmin. is the machining limit, and VC cannot be used.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step 1E	
	GVC	Gas vent machining GS • GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

For details of a Gas Release Core Pin, which is a product similar to alteration GVC, P.467

ONE-STEP CORE PINS

—SHAFT DIAMETER(P)DESIGNATION(0.01mm INCREMENTS) • SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ ／ $^{0}_{-0.005}$ TYPE—





When exceeds the size of tip (ℓ) dimension (Refer to lower right on the step drawing) ···› Details of the tip (ℓ) short type P.447 • 453

Non JIS material definition is listed on P.1351 - 1352

RoHS

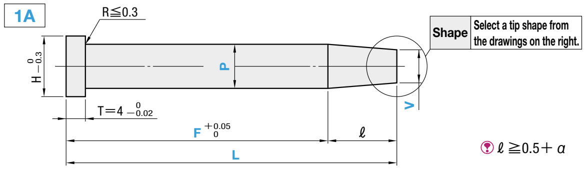
STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.
PROVA400 is equivalent to SUS420J2 upgrading steel from Fujikoshi. Features P.405

M	H	Type: Shaft diameter tolerance D $^{-0.01}_{-0.02}$, V • A tolerance ±0.015	Type: Shaft diameter tolerance D $^{0}_{-0.005}$, V • A tolerance ±0.01	Step	Shape
NAK80	37～43HRC	CPNB—	CPKB—		Not processed
DH2F	38～42HRC	CPFB—	CPGB—	1A	C
SKD61 equivalent	48～52HRC	CPDB—	CPPB—	1B	G
SKH51 equivalent	58～60HRC	CPXB—	CPHB—	1C	T
SUS440C	56～60HRC	—	CPWB—		
MAS1C	50～54HRC	CPAB—	CPYB—	1D	R
STAVAX ESR®	50～54HRC	CPTHB—	CPEHB—	1E	B
PROVA400	50～54HRC	CPQHB—	CPRHB—		

When Step 1E, A tolerance is ±0.02.

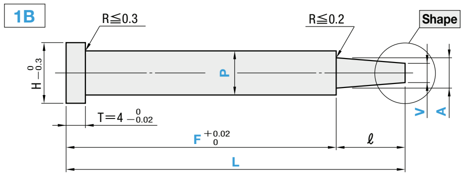
Step type selected from 1A～1E below

1A



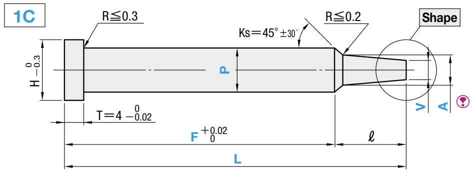
ℓ≧0.5+α

1B



ℓ≧0.7+α

1C

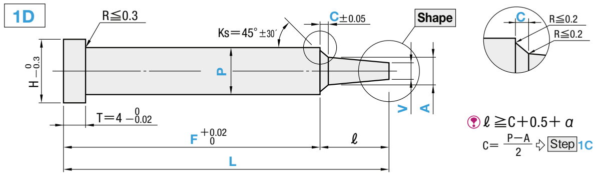


$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

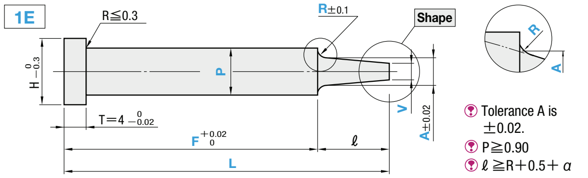
1D



ℓ≧C+0.5+α

$C=\frac{P-A}{2}$ ⇨ Step 1C

1E



Tolerance A is ±0.02.

P≧0.90

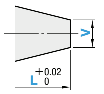
ℓ≧R+0.5+α

Refer to the Shape drawing for L tolerance

"PROVA400" and "MAS1C" will be discontinued when stocked materials are finished.

Shape (Tip shape: V is dimension before tip processing.)

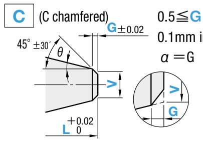
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

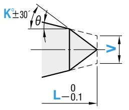
α=0

C (C chamfered)



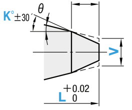
0.5≦G<V/2
0.1mm increments
α=G θ<45°

G (Cone)



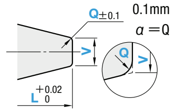
20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K}$ θ<K

T (Tapered)



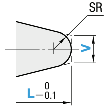
$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments
10≦K≦45
1° increments
α=S θ<K

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

(Calculation of tip gradient θ P.1315)

H	Part Number: Type	Part Number: Type	Part Number: Step	Part Number: Shape	Part Number: No.	0.01mm increments: L min.	0.01mm increments: L max.	0.01mm increments: min. P max.	0.01mm increments: F min.	0.01mm increments: F max.	0.01mm increments: A	0.01mm increments: Vmin.	0.1mm increments: C	0.1mm increments: R	ℓmax.
3	Shaft diameter tolerance $^{-0.01}_{-0.02}$	Shaft diameter tolerance $^{0}_{-0.005}$			1	12.00	100.00	0.80～ 0.99	10.00	L— ℓmin. ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{P-A}{2}$ and R≧0.2	15.00
	CPNB—	CPKB—		Designation is unnecessary when tip processing is not required.	1.5			1.00～ 1.49							20.00
4	(0.80≦P≦15.99)	(0.80≦P≦15.99)			2			1.50～ 1.99							25.00
5	CPFB—	CPGB—			2.5			2.00～ 2.49							30.00
6	(0.80≦P≦15.99)	(0.80≦P≦15.99)	1A		3			2.50～ 2.99				0.70			35.00
7	CPDB—	CPPB—			3.5		120.00 Only CPHB— 150.00	3.00～ 3.49				1.00			40.00
	(0.80≦P≦19.99)	(0.80≦P≦19.99)	1B	C	4			3.50～ 3.99							45.00
8	CPXB—	CPHB—			4.5			4.00～ 4.49							50.00
	(0.80≦P≦19.99)	(0.80≦P≦19.99)	1C		5			4.50～ 4.99							
9				G	5.5			5.00～ 5.49				1.50			
		CPWB—	1D		6			5.50～ 5.99				2.00			
10		(0.80≦P≦15.99)		T	6.5			6.00～ 6.49							
	CPAB—	CPYB—	1E		7			6.50～ 6.99							
11	(0.80≦P≦3.99)	(0.80≦P≦3.99)		R	8			7.00～ 7.99							
15	CPTHB—	CPEHB—			10			8.00～ 9.99							
18	(3.00≦P≦15.99)	(3.00≦P≦15.99)		B	13			10.00～12.99							
21	CPQHB—	CPRHB—			16			13.00～15.99							
25	(0.80≦P≦15.99)	(0.80≦P≦15.99)			20	30.00		16.00～19.99	28.00			5.00			

Step 1E for No.1 (P≧0.90)

Order

Part Number	— L	— P	— F	— A	— V	— C・R	— Tip size (K・S・G・Q)
CPNB—1A 5	— 58.00	— P4.95	— F40.00		— V4.50		
CPXB—1CC5.5	— 45.50	— P5.49	— F30.50	— A5.00	— V4.50		— G1.5
CPWB—1ET5	— 30.00	— P4.86	— F20.00	— A2.80	— V2.50	— R0.5	— K30—S1

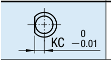
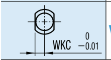
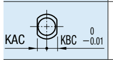
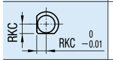
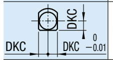
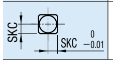
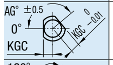
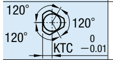
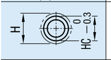
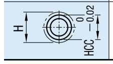
Days to Ship Quotation

Price Quotation

Alterations

Part Number	— L	— P	— F	— A	— V(VC)	— C(CVC)	— R(RE)	— Tip size (K・S・G・Q)	— (KC・WKC···etc.)
CPXB—1EC6	— 50.00	— P5.70	— F40.00	— A5.00	— V3.10		— RE1.5 —	G1.0	— HC8.0
CPGB—1A 5	— 58.00	— P4.60	— F50.00		— V4.40				— NHC—23

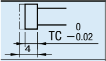
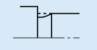
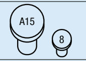
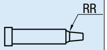
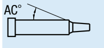
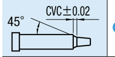
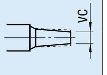
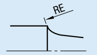
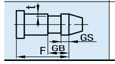
Alteration Details P.441

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2	
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	Quotation
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.005mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

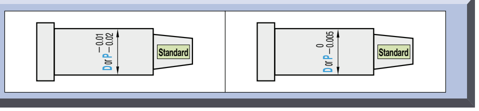
Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 Available when H≧2 Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (Strength has been improved) Designation method RR Available for Step 1B/1C/1D P−A≧1.0 When Step 1D, C≧0.5	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 Combination with CVC・RR not available When Step 1D, C≦1.0,A+2(C×tanAC)<P	Quotation
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(P−A)/2 Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5, ℓ≦50 (P×5 for Step 1A) P>A≧VC Regarding No.=2～3, 4.5, 5 and 13～16, Vmin. is the machining limit, and VC cannot be used.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step 1E	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

No.	Vmin.	VCmin.
1～1.5	0.50	0.40
3.5～4	1.00	0.70
5.5	1.50	1.00
6～10	2.00	1.50
20	5.00	4.00

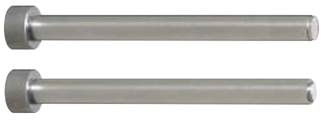
For details of a Gas Release Core Pin, which is a product similar to alteration GVC, P.469

SHORT TIP (ℓ) ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—



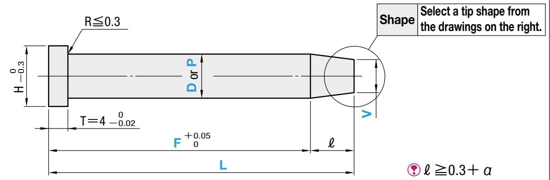
Non JIS material definition is listed on P.1351 - 1352



M / H	Shaft diameter (D) selection type: Shaft diameter tolerance −0.01/−0.02, V・A tolerance ±0.015	Shaft diameter (D) selection type: Shaft diameter tolerance 0/−0.005, V・A tolerance ±0.01	Shaft diameter (P) designation type: Shaft diameter tolerance −0.01/−0.02, V・A tolerance ±0.015	Shaft diameter (P) designation type: Shaft diameter tolerance 0/−0.005, V・A tolerance ±0.01	Step	Shape
SKD61 equivalent 48～52HRC	S−CPD−	S−CPP−	S−CPDB−	S−CPPB−	1A 1B 1C 1D	Not processed C T R B
SKH51 equivalent 58～60HRC	S−CPX−	S−CPH−	S−CPXB−	S−CPHB−		

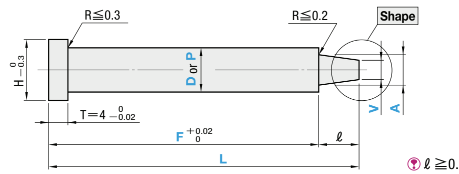
Step type selected from 1A～1D below

1A



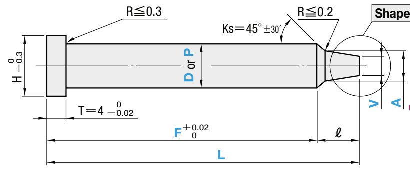
ℓ≧0.3+α

1B



ℓ≧0.4+α

1C

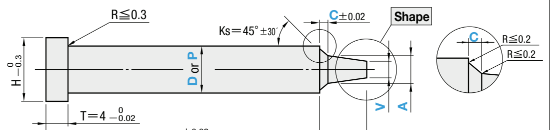


$\ell \geqq \frac{(D or P) - A}{2} + 0.3 + \alpha$

When AC code is used

$\ell \geqq \frac{(D or P) - A}{2\tan AC} + 0.3 + \alpha$

1D



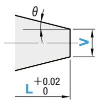
$\ell \geqq C + 0.3 + \alpha$

$C = \frac{(D or P) - A}{2}$ ⇨ Step 1C

Refer to the Shape drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

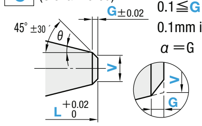
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

α=0　θ≦10°

C (C chamfered)

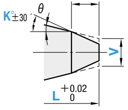


0.1≦G<V/2

0.1mm increments

α=G　θ≦10°

T (Tapered)



$0.1 \leqq S < \frac{V}{2\tan K}$

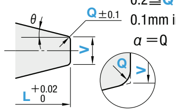
0.1mm increments

10≦K≦45

1° increments

α=S　θ≦10°

R (R chamfered)

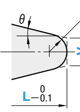


0.2≦Q<V/2

0.1mm increments

α=Q　θ≦10°

B (Spherical processed)



α=V/2　θ≦10°

(Calculation of tip gradient θ P.1315)

■Shaft diameter (D) selection type

H	Type (Shaft diameter tolerance −0.01/−0.02)	Type (Shaft diameter tolerance 0/−0.005)	Step	Shape	D	L min.	L max.	F min.	F max.	A	Vmin.	C	ℓmax.
3	S−CPD− S−CPX−	S−CPP− S−CPH−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C T R B	1	12.00	100.00	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	0.50	Only Step 1D designated $C < \frac{D-A}{2}$ and 0.10≦C≦0.50	ℓ≦D (when ℓ>D P.443)
					1.5								
4					2								
5					2.5								
6					3						0.70		
7					3.5						1.00		
					4								
8					4.5								
					5								
9					5.5						1.50		
					6						2.00		

■Shaft diameter (P) designation type

H	Type (Shaft diameter tolerance −0.01/−0.02)	Type (Shaft diameter tolerance 0/−0.005)	Step	Shape	No.	L min.	L max.	min. P max.	F min.	F max.	A	Vmin.	C	ℓmax.
3	S−CPDB− S−CPXB−	S−CPPB− S−CPHB−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C T R B	1	12.00	100.00	0.80～0.99	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	0.50 (1.00)	Only Step 1D designated $C < \frac{P-A}{2}$ and 0.10≦C≦0.50	ℓ≦P (when ℓ>P P.445)
					1.5			1.00～1.49						
4					2			1.50～1.99						
5					2.5			2.00～2.49						
6					3			2.50～2.99				0.70		
7					3.5			3.00～3.49				1.00		
					4			3.50～3.99						
8					4.5			4.00～4.49						
					5			4.50～4.99						
9					5.5			5.00～5.49				1.50		
					6			5.50～5.99				2.00		

Order

Part Number	—	L	—	P	—	F	—	A	—	V	—	C	—	Tip size (K・S・G・Q)
Shaft diameter (D) selection type S−CPD −1B 4	—	38.00			—	F37.50	—	A2.80	—	V2.74				
Shaft diameter (P) designation type S−CPPB−1BR4.5	—	45.00	—	P4.40	—	F44.40	—	A3.70	—	V3.60			—	Q0.2

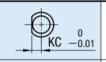
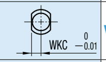
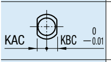
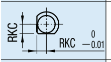
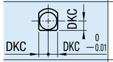
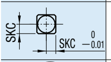
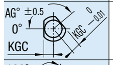
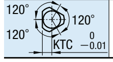
Days to Ship Quotation

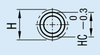
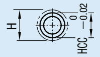
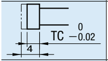
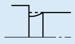
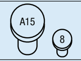
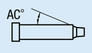
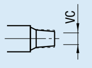
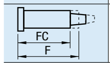
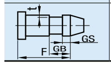
Price Quotation

Alterations

Part Number	—	L	—	P	—	F(FC)	—	A	—	V(VC)	—	C	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
Shaft diameter (D) selection type S−CPD −1A 2	—	15.00			—	F14.70			—	V1.95					—	HC3.8
Shaft diameter (P) designation type S−CPPB−1BR4.5	—	45.00	—	P4.40	—	F44.40	—	A3.70	—	V3.60			—	Q0.2	—	TC2

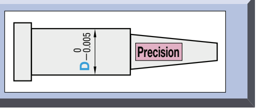
Alteration details P.441

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection type 0.05mm increments possible Shaft diameter (P) designation type 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting (D or P)/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2		
	DKC	Three flats cutting (D or P)/2≦DKC<H/2		
	SKC	Four flats cutting (D or P)/2≦SKC<H/2		
	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments　(D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments　1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 Available when H≧2 Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°) AC=1° increments　Available for Step 1C/1D 30≦AC≦60 When Step 1D, C≦1.0,A+2(C×tanAC)<(D or P)	
	VC	Vmin. is enlarged. VC=0.01mm increments Regarding DorNo.=2～3, 4.5 and 5, Vmin. is the machining limit, and VC cannot be used. (D or P)>A≧VC DorNo. 1～1.5: Vmin. 0.50, VCmin. 0.40 DorNo. 3.5～4: Vmin. 1.00, VCmin. 0.70 DorNo. 5.5: Vmin. 1.50, VCmin. 1.00 DorNo. 6: Vmin. 2.00, VCmin. 1.50	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC ≧ 5mm It can be designated up to Lmin. = 6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments　Available when (D or P)≧2 2≦GS≦10　GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

PRECISION ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE—


D 0/−0.005
Precision

ⓘ When exceeds the working limit of tip (ℓ) dimension (Refer to the step drawing lower right) ···› Details of the tip (ℓ) short type P.453

ⓘ Non JIS material definition is listed on P.1351 - 1352

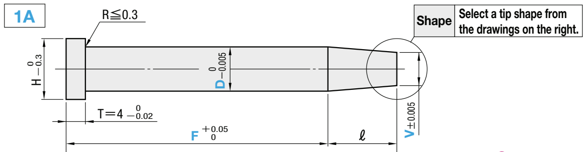
RoHS

M / H	Type	Step	Shape
SKD61 equivalent 48～52HRC	CPZ—	1A 1B 1C 1D 1E	Not processed C G T R B
SKH51 equivalent 58～60HRC	CPV—		

H	Part Number				0.01mm increments						0.1mm increments		ℓmax.
					L		F		A	Vmin.	C	R	
	Type	Step	Shape	D	min.	max.	min.	max.					
3	CPZ— CPV—	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	1	14.00	100.00	12.00	L−ℓmin. ⓘ ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	0.50	only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	only Step 1E designated $R\leqq\frac{D-A}{2}$ and R≧0.2	A×6 (D×6 for Step 1A) and 50.00
				1.5									
4				2									
5				2.5									
6				3						0.70			
7				3.5		120.00				1.00			
				4									
8				4.5									
				5		120.00 Only CPV— 150.00							
9				5.5						1.50			
				6						2.00			
10				6.5									
				7									
11				8									
15				10									
18				13									
21				16									
25				20	30.00		28.00			5.00			

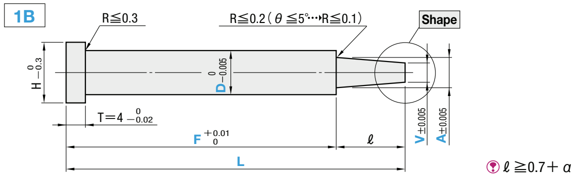
Step type selected from 1A～1E below

1A


R≦0.3
Shape
Select a tip shape from the drawings on the right.
H 0/−0.3
D 0/−0.005
T=4 0/−0.02
F +0.05/0
ℓ
V±0.005
L

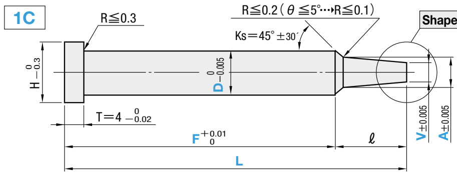
ⓘ ℓ≧0.5+α

1B


R≦0.3
R≦0.2(θ≦5°···›R≦0.1)
Shape
H 0/−0.3
D 0/−0.005
T=4 0/−0.02
F +0.01/0
ℓ
V±0.005
A±0.005
L

ⓘ ℓ≧0.7+α

1C

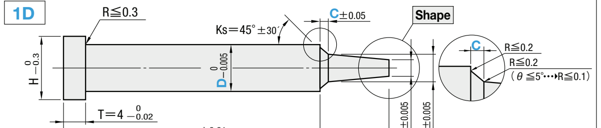

R≦0.3
R≦0.2(θ≦5°···›R≦0.1)
Ks=45°±30′
Shape
H 0/−0.3
D 0/−0.005
T=4 0/−0.02
F +0.01/0
ℓ
V±0.005
A±0.005
L

ⓘ $\ell \geqq \frac{D-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$

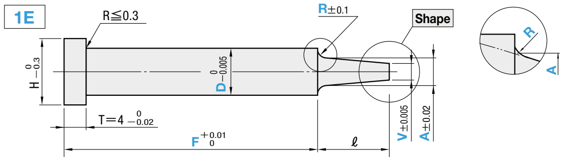
1D


R≦0.3
Ks=45°±30′
C±0.05
Shape
C
R≦0.2
R≦0.2
(θ≦5°···›R≦0.1)
H 0/−0.3
D 0/−0.005
T=4 0/−0.02
F +0.01/0
ℓ
V±0.005
A±0.005
L

ⓘ ℓ≧C+0.5+α

$C=\frac{D-A}{2}$ ⇨ Step 1C

1E

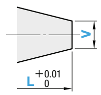

R≦0.3
R±0.1
Shape
R
A
H 0/−0.3
D 0/−0.005
T=4 0/−0.02
F +0.01/0
ℓ
V±0.005
A±0.02
L

ⓘ ℓ≧R+0.5+α

ⓘ Refer to the Shape drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

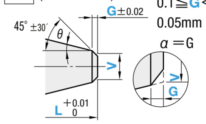
(Not processed)



ⓘ Designation of the shape is unnecessary when tip processing is not required.

α=0

C (C chamfered)

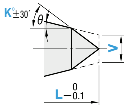

G±0.02
45°±30′
θ
V
G
L +0.01/0

0.1≦G<V/2

0.05mm increments

α=G θ<45°

G (Cone)

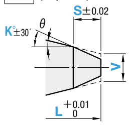


20<K≦60

1° increments

$\alpha=\frac{V}{2\tan K}$ θ<K

T (Tapered)


S±0.02
K°±30′
θ
V
L +0.01/0

$0.1\leqq S<\frac{V}{2\tan K}$

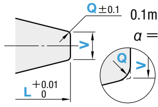
0.05mm increments

10≦K≦45

1° increments

α=S θ<K

R (R chamfered)

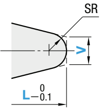

Q±0.1
V
Q
L +0.01/0

0.2≦Q<V/2

0.1mm increments

α=Q

B (Spherical processed)



α=V/2

(Calculation of tip gradient θ P.1315)

Order

Part Number	L	F	A	V	C・R	Tip size (K・S・G・Q)	
CPV—1BR6	46.00	F38.00	A5.00	V3.00		Q1.0	
CPV—1DG6	50.00	F40.00	A5.10	V3.00	C0.3	K40	
CPZ—1ET4	42.00	F35.00	A3.20	V3.10	R0.4	K35	S1.0

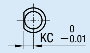
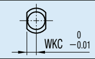
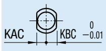
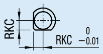
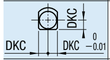
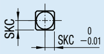
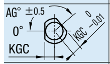
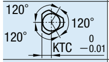
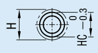
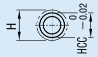
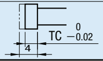
Days to Ship Quotation

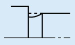
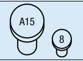
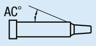
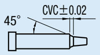
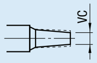
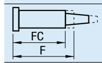
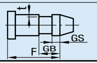
Price Quotation

Alterations

Part Number	L	F(FC)	A	V(VC)	C(CVC)・R	Tip size (K・S・G・Q)	(KC・WKC···etc.)
CPZ—1DC6	50.00	F40.00	A5.00	V3.10	CVC0.10	G1.0	HC8.0
CPV—1A 5	58.00	F50.00		V4.00			NHC—23

Alteration details P.441

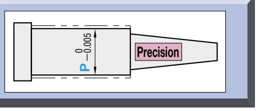
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
 KAC KBC 0/−0.01	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC 0/−0.01	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC 0/−0.01	DKC	Three flats cutting D/2≦DKC<H/2		
 SKC SKC 0/−0.01	SKC	Four flats cutting D/2≦SKC<H/2		
 AG°±0.5 0° KGC KGC 0/−0.01	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments		
 120° 120° 120° KTC 0/−0.01	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments D≦HC<H ⓘ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3		
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 ⓘ Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°) AC=1° increments ⓘ Available for Step 1C/1D ⓘ 30≦AC≦60 ⊗ Combination with CVC not available. ⓘ When Step 1D, C≦1.0,A+2(C×tanAC)<D	Quotation
	CVC	C dimension can be designated at 0.01mm increments. ⓘ 0.10≦CVC≦1.00 ⓘ Available for Step 1D ⓘ CVC<(D−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ⓘ ℓ≦A×5, ℓ≦50 (D×5 for Step 1A) ⓘ D>A≧VC D / Vmin. / VCmin.: 1～1.5 / 0.50 / 0.40; 3.5～4 / 1.00 / 0.70; 5.5 / 1.50 / 1.00; 6～10 / 2.00 / 1.50; 20 / 5.00 / 4.00 ⊗ Regarding D=2～3, 4.5, 5 and 13～16, Vmin. is the machining limit, and VC cannot be used.	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm ⓘ It can be designated up to Lmin.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments ⓘ Available when D≧2 ⓘ 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

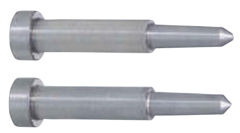
ⓘ For details of a Gas Release Core Pin, which is a product similar to alteration GVC, P.471

PRECISION ONE-STEP CORE PINS

—SHAFT DIAMETER (P) 0.005mm DESIGNATION TYPE—



❗ When exceeds the working limit of tip (ℓ) dimension (Refer to the step drawing lower right) ···› Details of the tip (ℓ) short type ☞ **P.453**

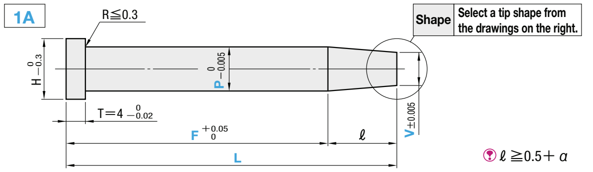


RoHS

M / H	Part Number		
	Type	Step	Shape
SKD61 equivalent 48~52HRC	CPZB—	1A 1B 1C 1D 1E	Not processed C G T R B
SKH51 equivalent 58~60HRC	CPVB—		

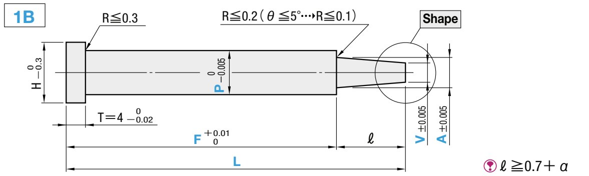
Step type selected from 1A~1E below

1A



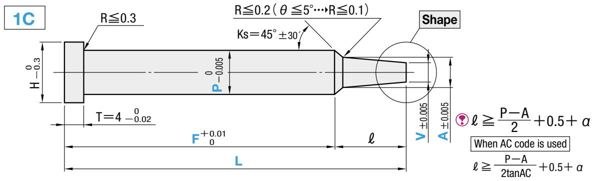
❗ $\ell \geqq 0.5+\alpha$

1B



❗ $\ell \geqq 0.7+\alpha$

1C

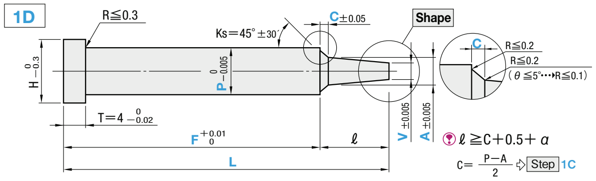


❗ $\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

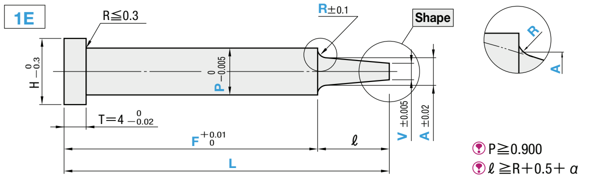
1D



❗ $\ell \geqq C+0.5+\alpha$

$C=\frac{P-A}{2}$ ⇨ Step 1C

1E



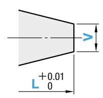
❗ P≧0.900

❗ $\ell \geqq R+0.5+\alpha$

❗ Refer to the Shape drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

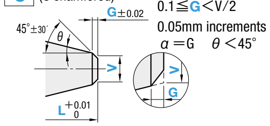
(Not processed)



❗ Designation of the shape is unnecessary when tip processing is not required.

$\alpha=0$

C (C chamfered)

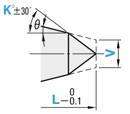


$0.1 \leqq G < V/2$

0.05mm increments

$\alpha = G \quad \theta < 45°$

G (Cone)

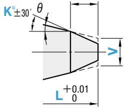


$20 < K \leqq 60$

1° increments

$\alpha = \frac{V}{2\tan K} \quad \theta < K$

T (Tapered)



$0.1 \leqq S < \frac{V}{2\tan K}$

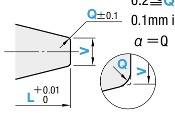
0.05mm increments

$10 \leqq K \leqq 45$

1° increments

$\alpha = S \quad \theta < K$

R (R chamfered)

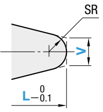


$0.2 \leqq Q < V/2$

0.1mm increments

$\alpha = Q$

B (Spherical processed)



$\alpha = V/2$

(Calculation of tip gradient θ ☞ **P.1315**)

❗ Non JIS material definition is listed on P.1351 - 1352

H	Type	Step	Shape	No.	L min. (0.01mm increments)	L max. (0.01mm increments)	min. P max. (0.005mm increments)	F min. (0.01mm increments)	F max. (0.01mm increments)	A (0.01mm increments)	Vmin. (0.01mm increments)	C (0.1mm increments)	R (0.1mm increments)	ℓmax.
3	CPZB— CPVB—	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	1	14.00	100.00	0.800~ 0.995	12.00	L−ℓmin. ❗ ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	0.5	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.1≦CVC≦1.00	Only Step 1E designated $R\leqq\frac{P-A}{2}$ and R≧0.2	A×6 (P×6 for Step 1A) and 50.00
				1.5			1.000~ 1.495							
4				2			1.500~ 1.995							
5				2.5			2.000~ 2.495							
6				3			2.500~ 2.995				0.70			
7				3.5		120.00	3.000~ 3.495				1.00			
				4			3.500~ 3.995							
8				4.5			4.000~ 4.495							
				5		120.00 Only CPVB— 150.00	4.500~ 4.995							
9				5.5			5.000~ 5.495				1.50			
				6			5.500~ 5.995				2.00			
10				6.5			6.000~ 6.495							
				7			6.500~ 6.995							
11				8			7.000~ 7.995							
15				10			8.000~ 9.995							
18				13			10.000~12.995							
21				16			13.000~15.995							
25				20	30.00		16.000~19.995	28.00			5.00			

❗ Step 1E for No.1 (P≧0.900)

Order

Part Number	L	P	F	A	V	C · R	Tip size (K · S · G · Q)
CPZB—1A 5	42.00	P4.650	F36.50		V3.80		
CPZB—1CG6	45.50	P5.680	F37.50	A5.00	V4.50		K45
CPZB—1DR5.5	52.60	P5.480	F41.10	A4.90	V4.60	C0.2	Q0.5

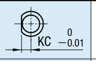
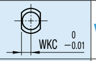
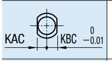
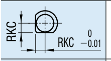
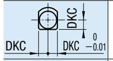
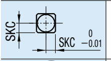
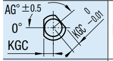
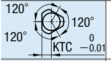
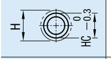
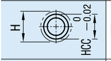
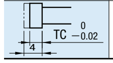
Days to Ship Quotation

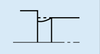
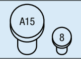
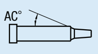
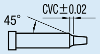
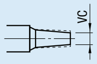
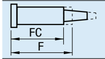
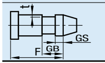
Price Quotation

Alterations

Part Number	L	P	F(FC)	A	V(VC)	C(CVC) · R	Tip size (K·S·G·Q)	(KC · WKC···etc.)
CPZB—1A 5	42.00	P4.650	F36.50		V3.80	CVC0.25		KC2.4
CPVB—1DC6	51.00	P5.755	F40.05	A3.20	V3.05		G0.6	HC8

Alteration details ☞ **P.441**

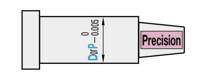
Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments P≦HC<H ❗ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	

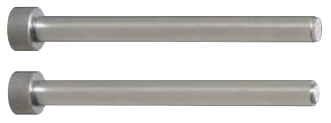
Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	Quotation
	NHC	Numbering on the head How to order ☞ **P.442** ❗ Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°) AC=1° increments ❗ Available for Step 1C/1D ❗ 30≦AC≦60 ⊗ Combination with CVC not available. ❗ When Step 1D, C≦1.0,A+2(C×tanAC)<P	
	CVC	C dimension can be designated at 0.01mm increments. ❗ 0.10≦CVC≦1.00 ❗ Available for Step 1D ❗ CVC<(P−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ❗ ℓ≦A×5, ℓ≦50 (P×5 for Step 1A) ❗ P>A≧VC No. Vmin. VCmin. 1~1.5 0.50 0.40 3.5~4 1.00 0.70 5.5 1.50 1.00 6~10 2.00 1.50 20 5.00 4.00 ⊗ Regarding No.=2~3, 4.5, 5 and 13~16, Vmin. is the machining limit, and VC cannot be used.	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm ❗ It can be designated up to Lmin.=6.5mm.	
	GVC	Gas vent machining GS · GB=1mm increments ❗ Available when P≧2.00 ❗ 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ **P.442**	

❗ For details of a Gas Release Core Pin, which is a product similar to alteration GVC, ☞ **P.471**

PRECISION SHORT TIP (ℓ) ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) 0.005mm DESIGNATION TYPE—


DorP −0.005 0
Precision

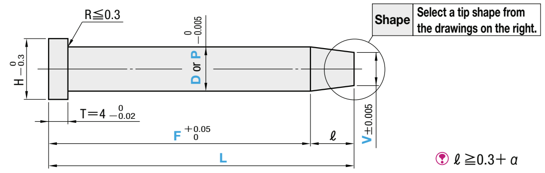


RoHS

M / H	Type: Shaft diameter (D) selection type	Type: Shaft diameter (P) designation type	Step	Shape
SKD61 equivalent 48～52HRC	S−CPZ−	S−CPZB−	1A 1B 1C 1D	Not processed C T R B
SKH51 equivalent 58～60HRC	S−CPV−	S−CPVB−		

Step type selected from 1A～1D below

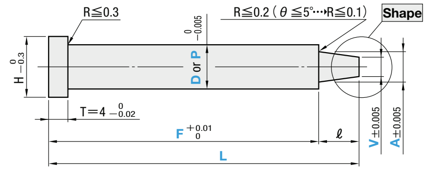
1A


R≦0.3
0 −0.005
D or P
H 0 −0.3
T=4 0 −0.02
F +0.05 0
ℓ
V±0.005
L

Shape Select a tip shape from the drawings on the right.

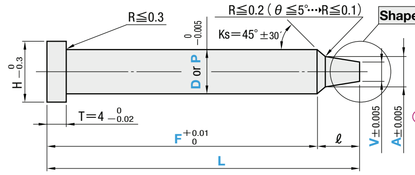
ℓ ≧0.3+ α

1B


R≦0.3
R≦0.2 (θ ≦5°…R≦0.1)
Shape
0 −0.005
D or P
H 0 −0.3
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.005
L

ℓ ≧0.4+ α

1C

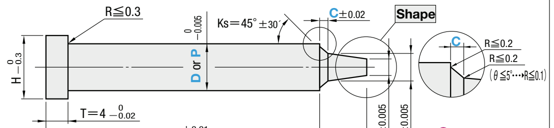

R≦0.3
R≦0.2 (θ ≦5°…R≦0.1)
Shape
Ks=45° ±30′
0 −0.005
D or P
H 0 −0.3
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.005
L

$\ell \geqq \frac{(DorP)-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{(DorP)-A}{2\tan AC}+0.3+\alpha$

1D


R≦0.3
Ks=45° ±30′
C±0.02
Shape
0 −0.005
D or P
H 0 −0.3
C
R≦0.2
R≦0.2
(θ ≦5°…R≦0.1)
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.005
L

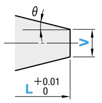
ℓ ≧C+0.3+ α

$C=\frac{(DorP)-A}{2}$ ⇨ Step 1C

Refer to the **Shape** drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

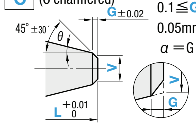
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

α =0　θ ≦10°

C (C chamfered)

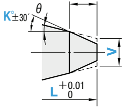

45° ±30′
θ
G±0.02
V
G
L +0.01 0

0.1≦G<V/2

0.05mm increments

α =G　θ ≦10°

T (Tapered)


K°±30′
θ
S±0.02
V
L +0.01 0

$0.1 \leqq S < \frac{V}{2\tan K}$

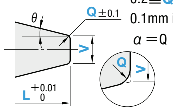
0.05mm increments

10≦K≦45

1° increments

α =S　θ ≦10°

R (R chamfered)

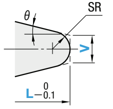

θ
Q±0.1
V
Q
L +0.01 0

0.2≦Q<V/2

0.1mm increments

α =Q　θ ≦10°

B (Spherical processed)



α =V/2　θ ≦10°

(Calculation of tip gradient θ P.1315)

Non JIS material definition is listed on P.1351 - 1352

■Shaft diameter (D) selection type

H	Part Number				0.01mm increments							ℓmax.
					L		F		A	Vmin.	C	
	Type	Step	Shape	D	min.	max.	min.	max.				
3	S−CPZ− S−CPV−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C T R B	1	12.00	100.00	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{D-A}{2}$ and 0.10≦C≦0.50	ℓ≦D (when ℓ>D P.449)
				1.5								
4				2								
5				2.5								
6				3						0.70		
7				3.5						1.00		
				4								
8				4.5								
				5								
9				5.5						1.50		
				6						2.00		

■Shaft diameter (P) designation type

H	Part Number				0.01mm increments		0.005mm increments	0.01mm increments					ℓmax.
					L		P	F		A	Vmin.	C	
	Type	Step	Shape	No.	min.	max.	min.max.	min.	max.				
3	S−CPZB− S−CPVB−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C T R B	1	12.00	100.00	0.800～0.995	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{P-A}{2}$ and 0.10≦C≦0.50	ℓ≦P (when ℓ>P P.451)
				1.5			1.000～1.495						
4				2			1.500～1.995						
5				2.5			2.000～2.495						
6				3			2.500～2.995				0.70		
7				3.5			3.000～3.495				1.00		
				4			3.500～3.995						
8				4.5			4.000～4.495						
				5			4.500～4.995						
9				5.5			5.000～5.495				1.50		
				6			5.500～5.995				2.00		

Order

Part Number	L	P	F	A	V	C	Tip size (K・S・G・Q)
Shaft diameter (D) selection type S−CPZ −1B 4	38.00		F37.50	A2.80	V2.74		
Shaft diameter (P) designation type S−CPVB −1BR 4.5	45.00	P4.40	F44.40	A3.70	V3.60		Q0.2

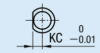
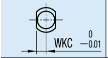
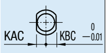
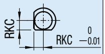
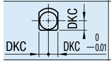
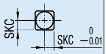
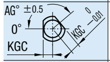
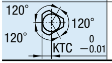
Days to Ship Quotation

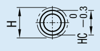
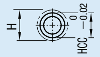
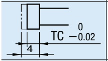
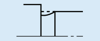
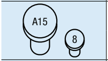
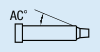
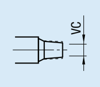
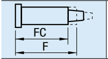
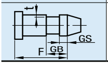
Price Quotation

Alterations

Part Number	L	P	F(FC)	A	V(VC)	C	Tip size (K・S・G・Q)	(KC・WKC…etc.)
Shaft diameter (D) selection type S−CPZ −1A 2	15.00		F14.70		V1.95			HC3.8
Shaft diameter (P) designation type S−CPVB−1BR4.5	45.00	P4.40	F44.40	A3.70	V3.60		Q0.2	TC2

Alteration details P.441

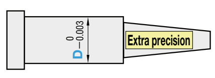
Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection type 0.05mm increments possible Shaft diameter (P) designation type 0.0025mm increments possible	Quotation
	WKC	Two flats cutting (D or P)/2≦WKC<H/2		
 KAC KBC 0 −0.01	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC 0 −0.01	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2		
 DKC DKC DKC 0 −0.01	DKC	Three flats cutting (D or P)/2≦DKC<H/2		
 SKC SKC 0 −0.01	SKC	Four flats cutting (D or P)/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC 0 −0.01	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments	(2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
 120° 120° 120° KTC 0 −0.01	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments　(D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments　1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°) AC=1° increments　Available for Step 1C 30≦AC≦60 When Step 1D, C≦1.0,A+2(C×tanAC)<(D or P)	
	VC	Vmin. is enlarged. VC=0.01mm increments (D or P)>A≧VC ⊗ Regarding DorNo.=2～3, 4.5 and 5, Vmin. is the machining limit, and VC cannot be used.	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC ≧ 5mm It can be designated up to Lmin. = 6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments　Available when (D or P)≧2 2≦GS≦10　GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

DorNo.	Vmin.	VCmin.
1～1.5	0.50	0.40
3.5～4	1.00	0.70
5.5	1.50	1.00
6	2.00	1.50

EXTRA PRECISION ONE-STEP CORE PINS

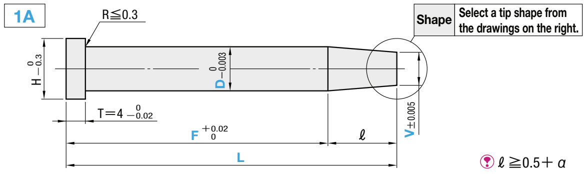
—SHAFT DIAMETER (D) SELECTION TYPE—

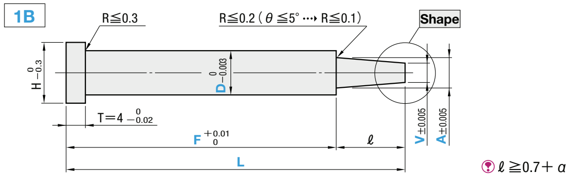

D $^{0}_{-0.003}$
Extra precision

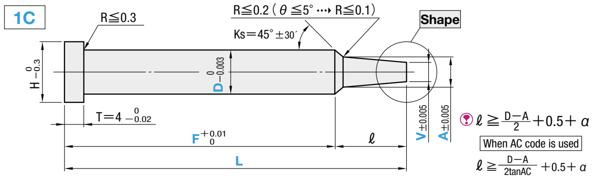
When exceeds the working limit of tip (ℓ) dimension (Refer to the step drawing lower right)···› Details of the tip (ℓ) short type ☞ **P.459**

M / H	Part Number Type	Step	Shape
SKH51 equivalent 58~60HRC	CPM—	1A	Not processed
		1B	C
			G
		1C	T
		1D	R
		1E	B

Step type selected from 1A~1E below


1A
R≦0.3
Shape
Select a tip shape from the drawings on the right.
H $^{0}_{-0.3}$
D $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
V±0.005
L
ℓ≧0.5+α

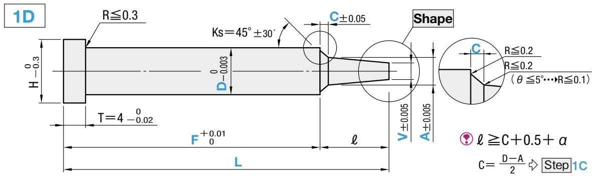

1B
R≦0.3
R≦0.2 (θ≦5° ···› R≦0.1)
Shape
H $^{0}_{-0.3}$
D $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
V±0.005
A±0.005
L
ℓ≧0.7+α


1C
R≦0.3
R≦0.2 (θ≦5° ···› R≦0.1)
Ks=45°±30´
Shape
H $^{0}_{-0.3}$
D $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
V±0.005
A±0.005
L

$\ell \geqq \frac{D-A}{2}+0.5+\alpha$

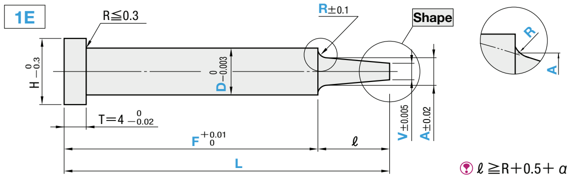
When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$


1D
R≦0.3
Ks=45°±30´
C±0.05
Shape
C
R≦0.2
R≦0.2
(θ≦5° ···› R≦0.1)
H $^{0}_{-0.3}$
D $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
V±0.005
A±0.005
L

ℓ≧C+0.5+α

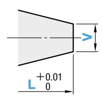
$C=\frac{D-A}{2}$ ⇨ Step 1C


1E
R≦0.3
R±0.1
Shape
R
A
H $^{0}_{-0.3}$
D $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
V±0.005
A±0.02
L
ℓ≧R+0.5+α

Refer to the Shape drawing for L tolerance

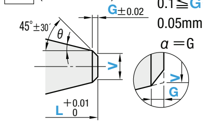
Shape (Tip shape: V is dimension before tip processing.)

(Not processed)



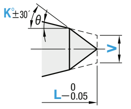
Designation of the shape is unnecessary when tip processing is not required.
α=0

C (C chamfered)


G±0.02
45°±30´
θ
V
L $^{+0.01}_{0}$
V
G

0.1≦G<V/2
0.05mm increments
α=G θ<45°

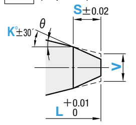
G (Cone)


K°±30´
θ
V
L $^{0}_{-0.05}$

20<K≦60
1° increments

$\alpha=\frac{V}{2\tan K}$ θ<K

T (Tapered)

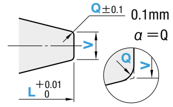

S±0.02
K°±30´
θ
V
L $^{+0.01}_{0}$

$0.1 \leqq S < \frac{V}{2\tan K}$

0.05mm increments

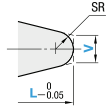
10≦K≦45
1° increments
α=S θ<K

R (R chamfered)


Q±0.1
V
L $^{+0.01}_{0}$
Q
V

0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

(Calculation of tip gradient θ ☞ **P.1315**)

Non JIS material definition is listed on P.1351 - 1352

H	Part Number Type	Step	Shape	D	0.01mm increments L min.	L max.	F min.	F max.	0.005mm increments A	Vmin.	0.1mm increments C	R	ℓmax.
3	CPM—	1A	Designation is unnecessary when tip processing is not required.	1	14.00	100.00	12.00	L−ℓmin. ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	0.500	Only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{D-A}{2}$ and R≧0.2	A×6 (D×6 for Step 1A) and 50.00
				1.5									
4				2									
5				2.5									
6		1B		3						0.700			
7			C	3.5						1.000			
				4									
8		1C	G	4.5									
				5									
9			T	5.5						1.500			
				6						2.000			
10		1D	R	6.5									
				7									
11				8									
15		1E	B	10									
18				13									

Order

Part Number	—	L	—	F	—	A	—	V	—	C・R	—	Tip size (K・S・G・Q)
CPM—1A 5	—	58.00	—	F40.00			—	V4.500				
CPM—1CC6.5	—	54.50	—	F48.35	—	A5.500	—	V5.300			—	G0.5
CPM—1ET 4	—	42.00	—	F35.00	—	A3.200	—	V3.100	—	R0.4	—	K35 — S1.0

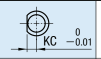
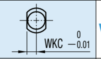
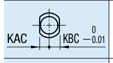
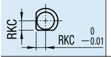
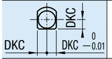
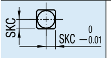
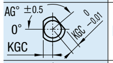
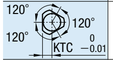
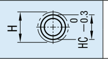
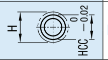
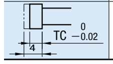
Days to Ship Quotation

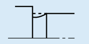
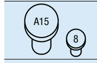
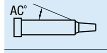
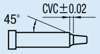
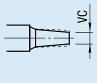
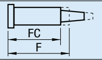
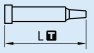
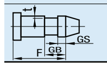
Price Quotation

Alterations

Part Number	—	L	—	F(FC)	—	A	—	V(VC)	—	C(CVC)・R	—	Tip size (K・S・G・Q)	—	(KC・WKC···etc.)
CPM—1DC6	—	50.00	—	F40.00	—	A5.000	—	V3.100	—	CVC0.10	—	G1.0	—	HC8.0
CPM—1A 5	—	58.00	—	F50.00			—	V4.000					—	NHC—23

Alteration details ☞ P.441

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting D/2≦DKC<H/2		
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting D/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments		
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3		
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	Quotation
	NHC	Numbering on the head How to order ☞ **P.442** Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC not available. When Step 1D, C≦1.0,A+2(C×tanAC)<D	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 Available for Step 1D CVC<(D−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.005mm increments ℓ≦A×5, ℓ≦50 (D×5 for Step 1A) D>A≧VC ⊗ Regarding D=2~3, 4.5, 5 and 13, Vmin. is the machining limit, and VC cannot be used.	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm It can be designated up to Lmin.=6.5mm.	
	LKC	Changes L dimension tolerance $L^{+0.01}_{0}$ ⇨ $L^{+0.005}_{0}$ (L designation in 0.005mm increments possible) Available when 1.5≦D≦5 ⊗ Combination with FC not available No Shape machining Available for C/T/R	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ **P.442**	

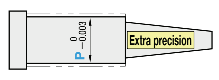
VC table:

D	Vmin.	VCmin.
1~1.5	0.500	0.400
3.5~4	1.000	0.700
5.5	1.500	1.000
6~10	2.000	1.500

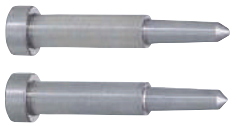
For details of a Gas Release Core Pin, which is a product similar to alteration GVC, ☞ **P.473**

EXTRA PRECISION ONE-STEP CORE PINS

—SHAFT DIAMETER (P) DESIGNATION (0.001mm INCREMENTS) TYPE—


P −0.003 0
Extra precision

When exceeds the working limit of tip (ℓ) dimension (Refer to the step drawing lower right) ···› Details of the tip (ℓ) short type ☞ **P.459**

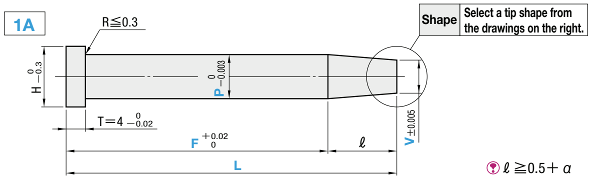


RoHS

M / H	Part Number Type	Step	Shape
SKH51 equivalent 58～60HRC	CPMB—	1A 1B 1C 1D 1E	Not processed C G T R B

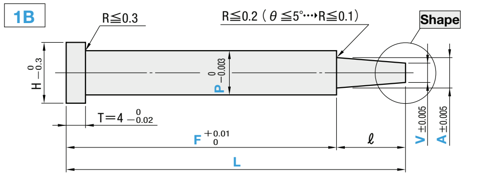
Step type selected from 1A～1E below

1A


R≦0.3
Shape
Select a tip shape from the drawings on the right.
H 0 −0.3
P 0 −0.003
T=4 0 −0.02
F +0.02 0
ℓ
V±0.005
L

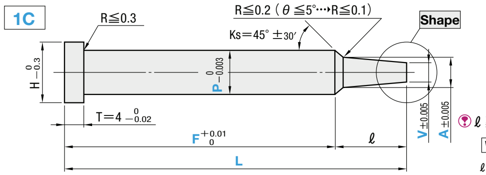
ℓ≧0.5+α

1B


R≦0.3
R≦0.2 (θ≦5°···›R≦0.1)
Shape
H 0 −0.3
P 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.005
L

ℓ≧0.7+α

1C

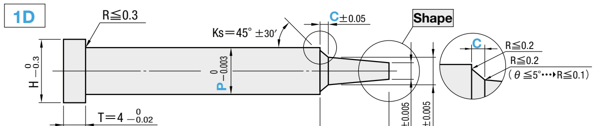

R≦0.3
R≦0.2 (θ≦5°···›R≦0.1)
Ks=45° ±30′
Shape
H 0 −0.3
P 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.005
L

$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

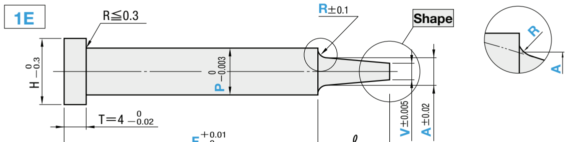
1D


R≦0.3
Ks=45° ±30′
C±0.05
Shape
C
R≦0.2
R≦0.2
(θ≦5°···›R≦0.1)
H 0 −0.3
P 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.005
L

ℓ≧C+0.5+α

$C=\frac{P-A}{2}$ ⇨ Step 1C

1E


R≦0.3
R±0.1
Shape
R
A
H 0 −0.3
P 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
V±0.005
A±0.02
L

P≧0.900

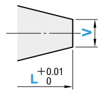
ℓ≧R+0.5+α

Refer to the Shape drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

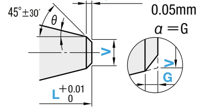
(Not processed)

Designation of the shape is unnecessary when tip processing is not required.



α=0

C (C chamfered)

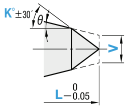

G±0.02
45°±30′
θ
V
G
L +0.01 0

0.1≦G<V/2

0.05mm increments

α=G θ<45°

G (Cone)

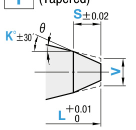

K°±30′
θ
V
L 0 −0.05

20<K≦60

1° increments

$\alpha=\frac{V}{2\tan K}$ θ<K

T (Tapered)


S±0.02
K°±30′
θ
V
L +0.01 0

$0.1 \leqq S < \frac{V}{2\tan K}$

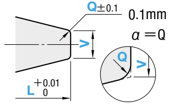
0.05mm increments

10≦K≦45

1° increments

α=S θ<K

R (R chamfered)

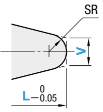

Q±0.1
V
Q
V
L +0.01 0

0.2≦Q<V/2

0.1mm increments

α=Q

B (Spherical processed)



α=V/2

(Calculation of tip gradient θ ☞ **P.1315**)

Non JIS material definition is listed on P.1351 - 1352

H	Part Number Type	Step	Shape	No.	0.01mm increments L min.	 max.	0.001mm increments min. P max.	0.01mm increments F min.	 max.	0.005mm increments A	 Vmin.	0.1mm increments C	 R	ℓmax.
3	CPMB—	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	1	14.00	100.00	0.800～ 0.999	12.00	L−ℓmin. ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	0.500	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.1≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{P-A}{2}$ and R≧0.2	A×6 (P×6 for Step 1A) and 50.00
				1.5			1.000～ 1.499							
4				2			1.500～ 1.999							
5				2.5			2.000～ 2.499							
6				3			2.500～ 2.999				0.700			
7				3.5			3.000～ 3.499				1.000			
				4			3.500～ 3.999							
8				4.5			4.000～ 4.499							
				5			4.500～ 4.999							
9				5.5			5.000～ 5.499				1.500			
				6			5.500～ 5.999				2.000			
10				6.5			6.000～ 6.499							
				7			6.500～ 6.999							
11				8			7.000～ 7.999							
15				10			8.000～ 9.999							
18				13			10.000～12.999							

Step 1E for No.1 (P≧0.900)

Order

Part Number		L		P		F		A		V		C・R		Tip size (K・S・G・Q)
CPMB−1A 5	—	42.00	—	P4.650	—	F36.50			—	V3.800				
CPMB−1BC6	—	48.55	—	P5.865	—	F40.00	—	A5.000	—	V4.500			—	G0.8
CPMB−1DR5.5	—	52.60	—	P5.480	—	F41.10	—	A4.900	—	V4.600	—	C0.2	—	Q0.5

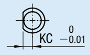
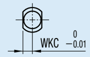
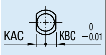
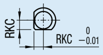
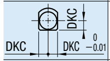
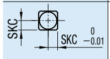
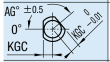
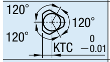
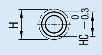
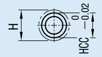
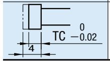
Days to Ship Quotation

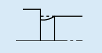
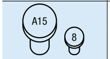
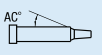
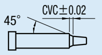
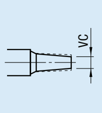
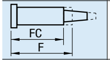
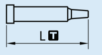
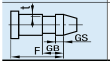
Price Quotation

Alterations

Part Number		L		P		F(FC)		A		V(VC)		C(CVC)・R		Tip size (K・S・G・Q)		(KC・WKC···etc.)
CPMB−1A 5	—	42.00	—	P4.650	—	F36.50			—	V3.800					—	KC2.4
CPMB−1DC6	—	51.00	—	P5.755	—	F40.05	—	A3.200	—	V3.050	—	CVC0.25	—	G0.6	—	HC8

Alteration details ☞ **P.441**

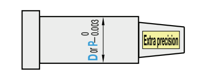
Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.0005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
 KAC KBC 0 −0.01	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC 0 −0.01	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
 DKC DKC DKC 0 −0.01	DKC	Three flats cutting P/2≦DKC<H/2		
 SKC SKC 0 −0.01	SKC	Four flats cutting P/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC 0 −0.01	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments		
 120° 120° 120° KTC 0 −0.01	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3		
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	Quotation
	NHC	Numbering on the head How to order ☞ **P.442** Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC not available. When Step 1D, C≦1.0,A+2(C×tanAC)<P	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 Available for Step 1D CVC<(P−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.005mm increments ℓ≦A×5, ℓ≦50 (P×5 for Step 1A) P>A≧VC No. / Vmin. / VCmin.: 1～1.5 / 0.500 / 0.400; 3.5～4 / 1.000 / 0.700; 5.5 / 1.500 / 1.000; 6～10 / 2.000 / 1.500 ⊗ Regarding No.=2～3, 4.5, 5 and 13, Vmin. is the machining limit, and VC cannot be used.	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm It can be designated up to Lmin.=6.5mm.	
	LKC	Changes L dimension tolerance $L^{+0.01}_{0}$ ⇨ $L^{+0.005}_{0}$ (L designation in 0.005mm increments possible) Available when 1.500≦P≦5.000 ⊗ Combination with FC not available. No Shape machining Available for C/T/R	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ **P.442**	

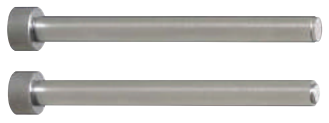
For details of a Gas Release Core Pin, which is a product similar to alteration GVC, ☞ **P.473**

EXTRA PRECISION SHORT TIP (ℓ)ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.001mm INCREMENTS) TYPE—



Non JIS material definition is listed on P.1351 - 1352

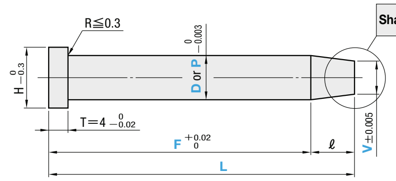


RoHS

M H	Part Number			
	Type		Step	Shape
	Shaft diameter (D) selection type	Shaft diameter (P) designation type		
SKH51 equivalent 58~60HRC	S−CPM−	S−CPMB−	1A 1B 1C 1D	Not processed C T R B

Step type selected from 1A~1D below

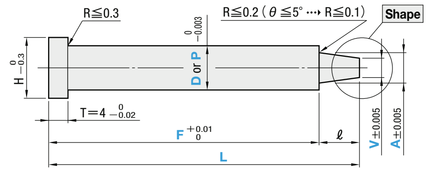
1A



Shape Select a tip shape from the drawings on the right.

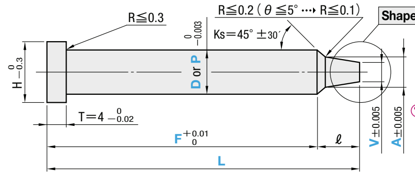
ℓ≧0.3+ α

1B



ℓ≧0.4+ α

1C

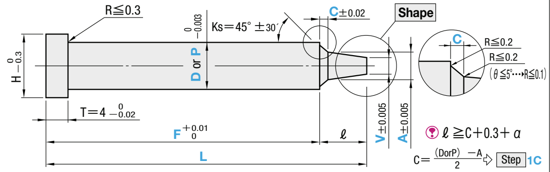


$\ell \geqq \frac{(DorP)\ -A}{2} +0.3+ \alpha$

When AC code is used

$\ell \geqq \frac{(DorP)\ -A}{2tanAC} +0.3+ \alpha$

1D



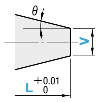
ℓ≧C+0.3+ α

$C= \frac{(DorP)\ -A}{2}$ ⇨ Step 1C

Refer to the **Shape** drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

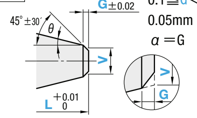
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

α =0 θ ≦10°

C (C chamfered)

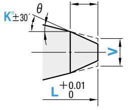


0.1≦G<V/2

0.05mm increments

α =G θ ≦10°

T (Tapered)



$0.1\leqq S< \frac{V}{2tanK}$

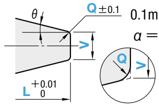
0.05mm increments

10≦K≦45

1° increments

α =S θ ≦10°

R (R chamfered)

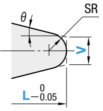


0.2≦Q<V/2

0.1mm increments

α =Q θ ≦10°

B (Spherical processed)



α =V/2 θ ≦10°

(Calculation of tip gradient θ ☞ P.1315)

■Shaft diameter (D) selection type

H	Part Number				0.01mm increments				0.005mm increments		0.01mm increments	ℓmax.
					L		F		A	Vmin.	C	
	Type	Step	Shape	D	min.	max.	min.	max.				
3	S−CPM−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C T R B	1	12.00	100.00	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	0.500	Only Step 1D designated C< (D−A)/2 and 0.10≦CVC≦0.50	ℓ≦D (when ℓ>D ☞ P.455)
3				1.5						0.500		
4				2						0.500		
5				2.5						0.500		
6				3						0.700		
7				3.5						1.000		
7				4						1.000		
8				4.5						1.000		
8				5						1.000		
9				5.5						1.500		
9				6						2.000		

■Shaft diameter (P) designation type

H	Part Number				0.01mm increments		0.001mm increments	0.01mm increments		0.005mm increments		0.01mm increments	ℓmax.
					L		P	F		A	Vmin.	C	
	Type	Step	Shape	No.	min.	max.	min. max.	min.	max.				
3	S−CPMB−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C T R B	1	12.00	100.00	0.800~0.999	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	0.500	Only Step 1D designated C< (P−A)/2 and 0.10≦C≦0.50	ℓ≦P (When ℓ>P ☞ P.457)
3				1.5			1.000~1.499				0.500		
4				2			1.500~1.999				0.500		
5				2.5			2.000~2.499				0.500		
6				3			2.500~2.999				0.700		
7				3.5			3.000~3.499				1.000		
7				4			3.500~3.999				1.000		
8				4.5			4.000~4.499				1.000		
8				5			4.500~4.999				1.000		
9				5.5			5.000~5.499				1.500		
9				6			5.500~5.999				2.000		

Order

Part Number	L	P	F	A	V	C	Tip size (K・S・G・Q)
Shaft diameter (D) selection type S−CPM−1B 4	38.00		F37.50	A2.800	V2.740		
Shaft diameter (P) designation type S−CPMB−1BR4.5	45.00	P4.405	F44.40	A3.700	V3.600		Q0.2

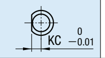
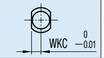
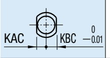
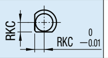
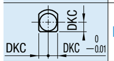
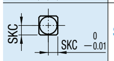
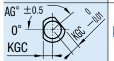
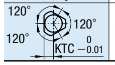
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	F(FC)	A	V(VC)	C	Tip size (K・S・G・Q)	(KC・WKC···etc.)
Shaft diameter (D) selection type S−CPM −1A 2	15.00		F14.70		V1.950			HC3.8
Shaft diameter (P) designation type S−CPMB −1BR4.5	45.00	P4.405	F44.40	A3.700	V3.600		Q0.2	TC2

Alteration details ☞ P.441

Alterations	Code	Spec.	1Code
 KC $^{0}_{-0.01}$	KC	Single flat cutting (D or P)/2≦KC<H/2	Quotation
 WKC $^{0}_{-0.01}$	WKC	Two flats cutting (D or P)/2≦WKC<H/2	
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2	
 DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting (D or P)/2≦DKC<H/2	
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting (D or P)/2≦SKC<H/2	
 AG° ±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments	
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2	

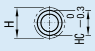
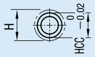
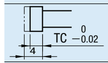
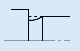
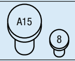
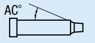
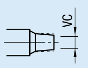
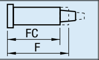
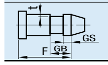
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter

Unit of designation Shaft diameter (D) selection type 0.05mm increments possible Shaft diameter (P) designation type 0.0005mm increments possible

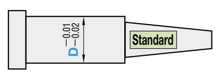
(2)To designate arbitrary key flat dimensions

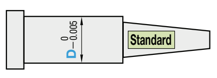
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC $^{0}_{-0.02}$	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
 TC $^{0}_{-0.02}$ 4	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
 A15 8	NHC	Numbering on the head How to order ☞ P.442 Available when H≧2 ⊗ Combination with SKC not available.	Quotation
 AC°	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C 30≦AC≦60 When Step 1D, C≦1.0,A+2(C×tanAC)<(D or P)	
 VC	VC	Vmin. is enlarged. VC=0.005mm increments (D or P)>A≧VC DorNo. / Vmin. / VCmin.: 1~1.5 / 0.500 / 0.400; 3.5~4 / 1.000 / 0.700; 5.5 / 1.500 / 1.000; 6 / 2.000 / 1.500 ⊗ Regarding D or No.=2~3, 4.5 and 5, Vmin. is the machining limit, and VC cannot be used.	
 FC F	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC ≧ 5mm It can be designated up to Lmin. = 6.5mm.	
 t GS F GB	GVC	Gas vent machining GS・GB=1mm increments Available when (D or P)≧2 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ P.442	

ONE- STEP CORE PINS

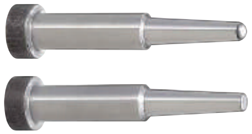
—TIP LAPPED · SHAFT DIAMETER (D) SELECTION · SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ / $^{0}_{-0.005}$ TYPE—

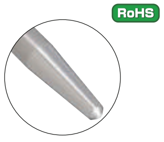




Non JIS material definition is listed on P.1351 - 1352

RoHS





Enlarged photograph of tip

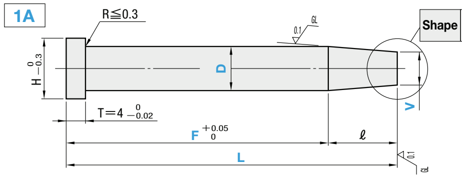
The tip of this product is lapped around the entire periphery.

M H T Shaft diameter·V·A	Part Number		
	Type	Step	Shape
SKD61 equivalent 48～52HRC Shaft diameter tolerance D $^{-0.01}_{-0.02}$ V · A tolerance ±0.015	L−CPD−	1A 1B 1C 1D 1E	Not processed C G T R B
SKH51 equivalent 58～60HRC Shaft diameter tolerance D $^{0}_{-0.005}$ V · A tolerance ±0.01	L−CPH−		

When Step 1E, A tolerance is ±0.02.

Step type selected from 1A ～ 1E below

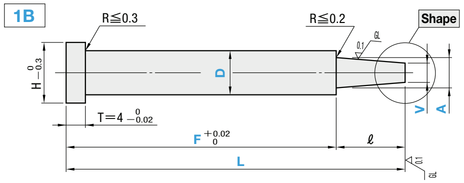
1A



Shape Select a tip shape from the drawings on the right.

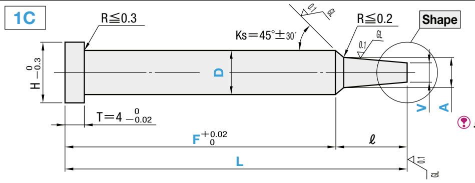
ℓ≧1.0+ α

1B



ℓ≧1.0+ α

1C

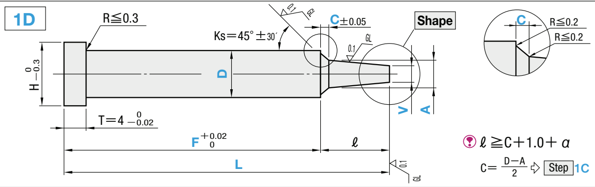


$\ell \geqq \frac{D-A}{2} + 1.0 + \alpha$

When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC^\circ} + 1.0 + \alpha$

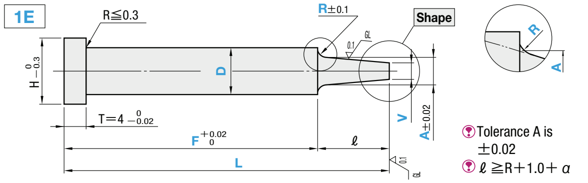
1D



ℓ≧C+1.0+ α

$C = \frac{D-A}{2}$ ⇨ Step 1C

1E



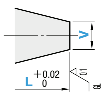
Tolerance A is ±0.02

ℓ≧R+1.0+ α

Refer to the Shape drawing for L tolerance The ℓ dimension face and the tip face are lapped.

Shape (Tip shape: V is dimension before tip processing.)

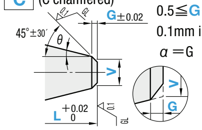
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

α =0

C (C chamfered)

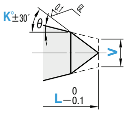


0.5≦G<V/2

0.1mm increments

α =G θ <45°

G (Cone)

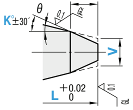


20<K≦60

1° increments

$\alpha = \frac{V}{2\tan K}$ θ <K

T (Tapered)



$0.1 \leqq S < \frac{V}{2\tan K}$

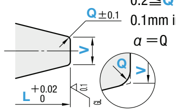
0.1mm increments

10≦K≦45

1° increments

α =S θ <K

R (R chamfered)

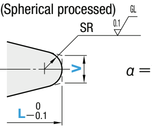


0.2≦Q<V/2

0.1mm increments

α =Q

B (Spherical processed)



α =V/2

(Calculation of tip gradient θ P.1315)

Order

Part Number	L	F	A	V	C · R	Tip size (K · S · G · Q)
L−CPH−1A 5	58.00	F40.00		V4.50		
L−CPD−1A 5	58.00	F40.00		V4.50		

H	Part Number				0.01mm increments						0.1mm increments		ℓmax.
					L		F		A	Vmin.	C	R	
	Type	Step	Shape	D	min.	max.	min.	max.					
3	Shaft diameter tolerance $^{-0.01}_{-0.02}$ L−CPD− Shaft diameter tolerance $^{0}_{-0.005}$ L−CPH−	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	1.5	12.00	100.00	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	D>A≧V Step 1A D>V No designation necessary for A	1.00	Only Step 1D designated $C < \frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{D-A}{2}$ and R≧0.2	A×6 and ℓ≦30
4				2									
5				2.5									
6				3									
7				3.5		120.00							
				4									
8				4.5									
				5									
9				5.5						1.50			
				6						2.00			

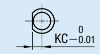
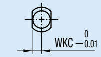
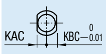
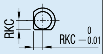
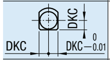
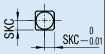
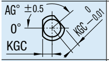
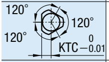
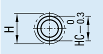
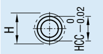
Price Quotation

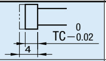
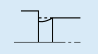
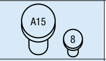
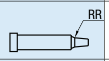
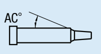
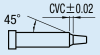
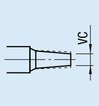
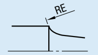
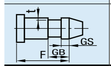
Quotation

Alterations

Part Number	L	F	A	V(VC)	C(CVC)	R(RE)	Tip size (K·S·G·Q)	(KC · WKC···etc.)
L−CPH−1EC6	50.00	F40.00	A5.00	V3.10		RE1.5	G1.0	HC8.0
L−CPD−1EC6	50.00	F40.00	A5.00	V3.10		RE1.5	G1.0	HC8.0

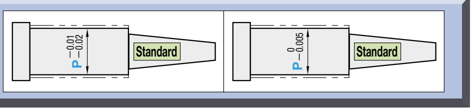
Alteration details P.441

Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	Quotation
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	

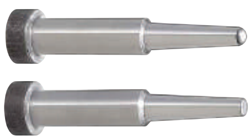
Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (Strength has been improved) Designation method RR Available for Step 1B/1C/1D D−A≧1.0 When Step 1D, C≧0.5	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 Combination with CVC · RR not available When Step 1D, C≦1.0,A+2(C×tanAC°)<D	Quotation
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(D−A)/2 Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦25 (D×5) for Step 1A D>A≧VC D / Vmin. / VCmin. 1.5 / 1.00 / 0.60 3.5 ～ 4 / 1.00 / 0.70 5.5 / 1.50 / 1.00 6 / 2.00 / 1.50 Regarding D=2～3, 4.5 and 5, Vmin. is the machining limit, and VC cannot be used.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step 1E	
	GVC	Gas vent machining GS · GB=1mm increments Available when D≧2 2≦GS≦10 GS 2≦GB≦30 Fmin.≦F−GB How to order P.442	

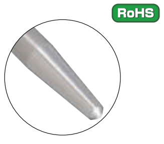
ONE- STEP CORE PINS

—TIP LAPPED・SHAFT DIAMETER (P) DESIGNATION・SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ ／ $^{0}_{-0.005}$ TYPE—


P $^{-0.01}_{-0.02}$
Standard
P $^{0}_{-0.005}$
Standard

RoHS





Enlarged photograph of tip

The tip of this product is lapped around the entire periphery.

M H T Shaft diameter・V・A	Part Number Type	Step	Shape
SKD61 equivalent 48～52HRC Shaft diameter tolerance P $^{-0.01}_{-0.02}$ V・A tolerance ±0.015	L−CPDB−	1A 1B 1C	Not processed C G T
SKH51 equivalent 58～60HRC Shaft diameter tolerance P $^{0}_{-0.005}$ V・A tolerance ±0.01	L−CPHB−	1D 1E	R B

When Step 1E, A tolerance is±0.02.

Non JIS material definition is listed on P.1351 - 1352

H	Part Number Type	Step	Shape	No.	L min.	L max.	min.Pmax	F min.	F max.	A	Vmin.	C	R	ℓmax.
3	Shaft diameter tolerance $^{-0.01}_{-0.02}$ L−CPDB−	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	1.5	12.00	100.00	1.30～1.49	10.00	L−ℓmin. ℓmin. Refer to the Step drawing	P>A≧V Step 1A P>V No designation necessary for A	1.00	Only Step 1D designated C< $\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	Only Step 1E designated R< $\frac{P-A}{2}$ and R≧0.2	A×6 and ℓ≦30
4				2			1.50～1.99							
5				2.5			2.00～2.49							
6				3			2.50～2.99							
7				3.5		120.00	3.00～3.49							
				4			3.50～3.99							
8	Shaft diameter tolerance $^{0}_{-0.005}$ L−CPHB−			4.5			4.00～4.49							
				5			4.50～4.99							
9				5.5			5.00～5.49				1.50			
				6			5.50～5.99				2.00			

(0.01mm increments: L, min.Pmax, F, A, Vmin.; 0.1mm increments: C, R)

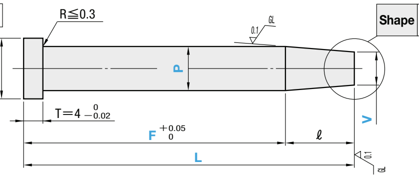
P Price **Quotation**

Quotation

Step type selected from 1A～1E below

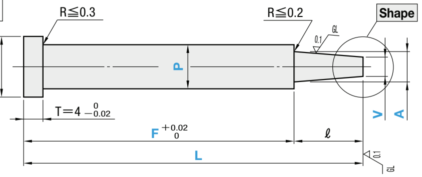
Shape Select a tip shape from the drawings on the right.

1A


R≦0.3
H $^{0}_{-0.3}$
P
T=4 $^{0}_{-0.02}$
F $^{+0.05}_{0}$
ℓ
L
V
0.1
GL

ℓ≧1.0+ α

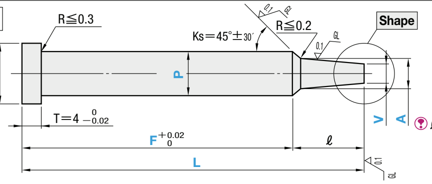
1B


R≦0.3
R≦0.2
H $^{0}_{-0.3}$
P
T=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
L
V
A
0.1
GL

Shape

ℓ≧1.0+ α

1C


R≦0.3
Ks=45°±30′
R≦0.2
H $^{0}_{-0.3}$
P
T=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
L
V
A
0.1
GL

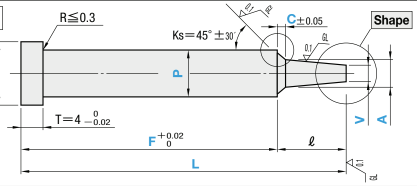
Shape

ℓ≧ $\frac{P-A}{2}$ +1.0+ α

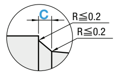
When AC code is used

ℓ≧ $\frac{P-A}{2tanAC°}$ +1.0+ α

1D


R≦0.3
Ks=45°±30′
C±0.05
H $^{0}_{-0.3}$
P
T=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
L
V
A
0.1
GL

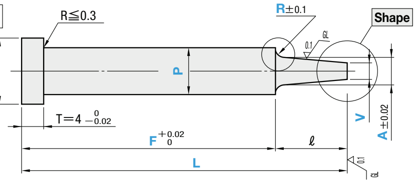
Shape



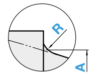
ℓ≧C+1.0+ α

C= $\frac{P-A}{2}$ ⇨ Step 1C

1E


R≦0.3
R±0.1
H $^{0}_{-0.3}$
P
T=4 $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
L
V
A±0.02
0.1
GL

Shape

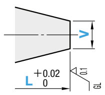


Tolerance A is ±0.02

ℓ≧R+1.0+ α

Shape (Tip shape: V is dimension before tip processing.)

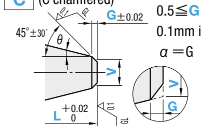
(Not processed)


V
L $^{+0.02}_{0}$
0.1
GL

Designation of the shape is unnecessary when tip processing is not required.

α =0

C (C chamfered)

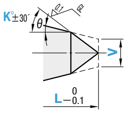

45°±30′
θ
0.1
GL
G±0.02
V
L $^{+0.02}_{0}$
G

0.5≦G<V/2

0.1mm increments

α =G θ <45°

G (Cone)

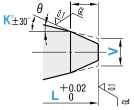

K°±30′
θ
0.1
GL
V
L $^{0}_{-0.1}$

20<K≦60

1° increments

α = $\frac{V}{2tanK}$ θ <K

T (Tapered)


θ
K°±30′
S±0.02
0.1
GL
V
L $^{+0.02}_{0}$

0.1≦S< $\frac{V}{2tanK}$

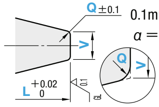
0.1mm increments

10≦K≦45

1° increments

α =S θ <K

R (R chamfered)

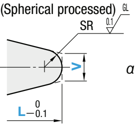

Q±0.1
V
L $^{+0.02}_{0}$
0.1
GL
Q
V

0.2≦Q<V/2

0.1mm increments

α =Q

B (Spherical processed)


GL
SR
0.1
V
L $^{0}_{-0.1}$

α =V/2

Refer to the Shape drawing for L tolerance The ℓ dimension face and the tip face are lapped.

(Calculation of tip gradient θ ☞ P.1315)

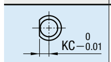
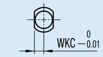
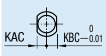
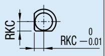
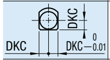
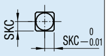
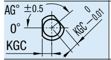
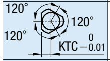
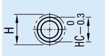
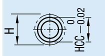
Order

Part Number	L	P	F	A	V	C・R	Tip size (K・S・G・Q)
L−CPDB−1A 5	58.00	P4.86	F40.00		V4.50		
L−CPHB−1A 5	58.00	P4.86	F40.00		V4.50		

Alterations

Part Number	L	P	F	A	V(VC)	C(CVC)	R(RE)	Tip size (K・S・G・Q)	(KC・WKC…etc.)
L−CPDB−1EC6	50.00	P5.70	F40.00	A5.00	V3.10		RE1.5	G1.0	HC8.0
L−CPHB−1EC6	50.00	P5.70	F40.00	A5.00	V3.10		RE1.5	G1.0	HC8.0

Alteration details ☞ P.441

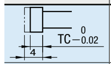
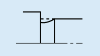
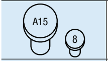
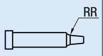
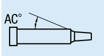
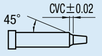
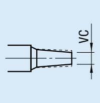
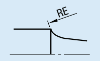
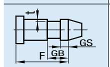
Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2	
	WKC	Two flats cutting P/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
	DKC	Three flats cutting P/2≦DKC<H/2	Quotation
	SKC	Four flats cutting P/2≦SKC<H/2	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	

KC $^{0}_{-0.01}$
WKC $^{0}_{-0.01}$
KAC
KBC $^{0}_{-0.01}$
RKC
RKC $^{0}_{-0.01}$
DKC
DKC $^{0}_{-0.01}$
SKC
SKC $^{0}_{-0.01}$
AG° ±0.5
0°
KGC
KGC $^{0}_{-0.01}$
120°
KTC $^{0}_{-0.01}$
H
HC $^{0}_{-0.3}$
HCC $^{0}_{-0.02}$

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation 0.005mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order ☞ P.442 ⊗ Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (Strength has been improved) Designation method RR Available for Step 1B/1C/1D P−A≧1.0 When Step 1D, C≧0.5	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC・RR not available When Step 1D, C≦1.0,A+2(C×tanAC°)<P	Quotation
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(P−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦25 (P×5 for Step 1A) P>A≧VC	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step 1E	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ P.442	

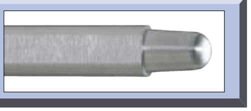
TC $^{0}_{-0.02}$
4
A15
8
RR
AC°
45°
CVC±0.02
VC
RE
F
GB
GS

No.	Vmin.	VCmin.
1.5	1.00	0.60
3.5～4	1.00	0.70
5.5	1.50	1.00
6	2.00	1.50

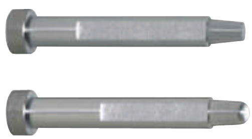
⊗ Regarding No.=2～3, 4.5 and 5, Vmin. is the machining limit, and VC cannot be used.

GAS RELEASE ONE-STEP CORE PINS WITH CUTTING FACETS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION TYPE—



Non JIS material definition is listed on P.1351 - 1352

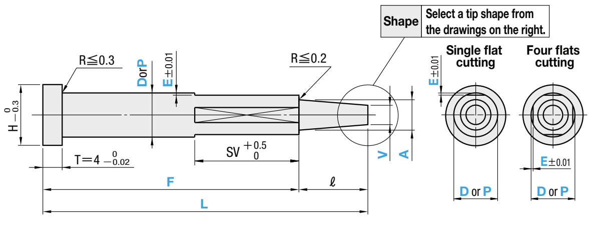


RoHS

M H	Type: Shaft diameter (D) selection type	Type: Shaft diameter (P) designation type	Step	Shape	Group	T: D or P	T: A · V	T: L · F
SKH51 equivalent 58~60HRC	GW−CPX− GWS−CPX−	GW−CPXB− GWS−CPXB−	1B 1C 1D	Not processed C G T R B	Standard	$^{-0.01}_{-0.02}$	±0.015	$^{+0.02}_{0}$ [GB only $L^{0}_{-0.1}$]
	GW−CPH− GWS−CPH−	GW−CPHB− GWS−CPHB−				$^{0}_{-0.005}$	±0.01	
	GW−CPV− GWS−CPV−	GW−CPVB− GWS−CPVB−			Precision	$^{0}_{-0.005}$	±0.005	$^{+0.01}_{0}$ [GB only $L^{0}_{-0.1}$]

Step type selected from 1B~1D below

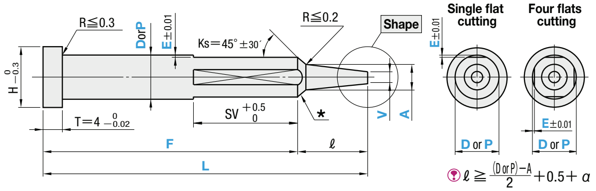
1B



Limit of E±0.01is within 10mm from the tip.

$\ell \geqq 0.7+\alpha$

1C



$\ell \geqq \frac{(D\ or\ P)-A}{2}+0.5+\alpha$

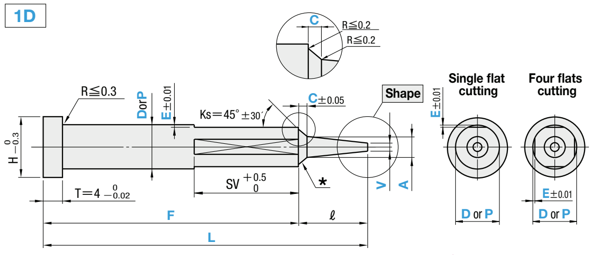
When AC code is used

$\ell \geqq \frac{(D\ or\ P)-A}{2\tan AC}+0.5+\alpha$

Limit of E±0.01is within 10mm from the tip.

Note: Part (*) may contact to the cutting face.

1D



$\ell \geqq C+0.5+\alpha$

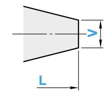
$C=\frac{(D\ or\ P)-A}{2}$ ⇨ Step 1C

Limit of E±0.01is within10mm from the tip.

Note: Part (*) may contact to the cutting face.

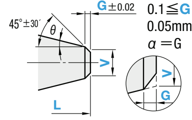
Shape (Tip shape: V is dimension before tip processing.)

(Not processed)



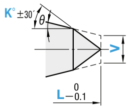
Designation of the shape is unnecessary when tip processing is not required.
$\alpha=0$

C (C chamfered)



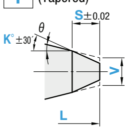
$0.1 \leqq G < V/2$
0.05mm increments
$\alpha=G \quad \theta < 45°$

G (Cone)



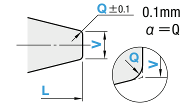
$20 < K \leqq 60$
1° increments
$\alpha=\frac{V}{2\tan K} \quad \theta < K$

T (Tapered)



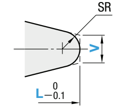
$0.1 \leqq S < \frac{V}{2\tan K}$
0.05mm increment
$10 \leqq K \leqq 45$
1° increments
$\alpha=S \quad \theta < K$

R (R chamfered)



$0.2 \leqq Q < V/2$
0.1mm increments
$\alpha=Q$

B (Spherical processed)



$\alpha=V/2$

(Calculation of tip gradient θ ☞ P.1315)

■Shaft diameter (D) selection type

H	Part Number: Type	Step	Shape	D	0.01mm increments: L	F	A	Vmin.	0.1mm increments: C	0.01mm increments: E	SV	ℓmax.
3	Single flat cutting GW−CPX− GW−CPH− GW−CPV− Four flats cutting GWS−CPX− GWS−CPH− GWS−CPV−	1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ~ 100.00	25.00 ~ L−ℓmin. ℓmin. Refer to the Step drawing	Step 1B D−2E>A≧V Step 1C,1D D>A≧V	0.50	Only Step 1D designated $C<\frac{D-A}{2}-E$ and ※0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	0.02 ~ 0.05	F 25.00~50.00: SV F−10 F 50.01~80.00: SV 40 F 80.01~: SV 50	A×6 and 50.00
				1.5								
4				2								
5				2.5								
6				3				0.70				
7				3.5	16.50 ~ 120.00			1.00				
				4								
8				4.5								
				5								
9				5.5				1.50				
				6				2.00				
10				7								
11				8								
15				10								
18				13								

■Shaft diameter (P) designation type

H	Part Number: Type	Step	Shape	No.	0.01mm increments: L	P: Standard 0.01mm increments	P: Precision 0.005mm increments	0.01mm increments: F	A	Vmin.	0.1mm increments: C	0.01mm increments: E	SV	ℓmax.
3	Single flat cutting GW−CPXB− GW−CPHB− GW−CPVB− Four flats cutting P≧1.000 GWS−CPXB− GWS−CPHB− GWS−CPVB−	1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ~ 100.00	0.80~ 0.99	0.800~ 0.995	25.00 ~ L−ℓmin. ℓmin. Refer to the Step drawing	Step 1B P−2E>A≧V Step 1C, 1D P>A≧V	0.50	Only Step 1D designated $C<\frac{P-A}{2}-E$ and ※0.1≦C≦4.0 ※When CVC code is used 0.1≦CVC≦1.00	0.02 ~ 0.05	F 25.00~50.00 SV=F−10 F 50.01~80.00 SV=40 F 80.01~ SV=50	A×6 and 50.00
				1.5		1.00~ 1.49	1.000~ 1.495							
4				2		1.50~ 1.99	1.500~ 1.995							
5				2.5		2.00~ 2.49	2.000~ 2.495							
6				3		2.50~ 2.99	2.500~ 2.995			0.70				
7				3.5	16.50 ~ 120.00	3.00~ 3.49	3.000~ 3.495			1.00				
				4		3.50~ 3.99	3.500~ 3.995							
8				4.5		4.00~ 4.49	4.000~ 4.495							
				5		4.50~ 4.99	4.500~ 4.995							
9				5.5		5.00~ 5.49	5.000~ 5.495			1.50				
				6		5.50~ 5.99	5.500~ 5.995			2.00				
10				7		6.00~ 6.99	6.000~ 6.995							
11				8		7.00~ 7.99	7.000~ 7.995							
15				10		8.00~ 9.99	8.000~ 9.995							
18				13		10.00~12.99	10.000~12.995							

Order

Part Number	L	P	F	A	V	C	Tip size (K · S · G · Q)	E
GW−CPVB−1BR6	46.00	P5.500	F38.00	A5.00	V3.00		Q1.0	E0.04

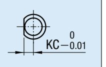
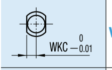
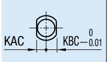
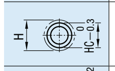
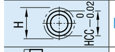
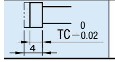
Days to Ship Quotation

Price Quotation

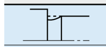
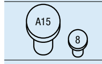
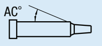
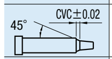
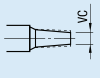
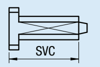
Alterations

Part Number	L	P	F	A	V(VC)	C(CVC)	Tip size (K·S·G·Q)	E	(KC · WKC···etc.)
GW−CPVB−1B 5	58.00	P4.995	F50.00	A4.20	V4.00			E0.02	NHC−23

Alteration details ☞ P.441

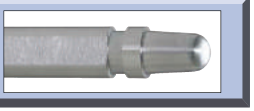
Alterations	Code	Spec.	1Code
 KC 0 −0.01	KC	Single flat cutting (D or P)/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection type 0.05mm increments possible Shaft diameter (P) designation type 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC 0 −0.01	WKC	Two flats cutting (D or P)/2≦WKC<H/2	
 KAC KBC 0 −0.01	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
 H HC 0 −0.3	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC 0 −0.02	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
 TC 0 −0.02 4	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	

Flat cutting position is set at 90° of cutting facet in counterclockwise direction.

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	Quotation
 A15 8	NHC	Numbering on the head How to order ☞ P.442 Available when H≧2	
 AC°	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC not available. 1D, C≦1.0,A+2(C×tanAC)<(D or P)	
 45° CVC±0.02	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 Available for Step 1D CVC<[(D or P)−A]/2 ⊗ Combination with AC not available.	
 VC	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦50 Step 1B {(D−2E)or(P−2E)}>A≧VC Step 1C,1D (D or P)>A≧VC D or No. 1~1.5: Vmin. 0.50, VCmin. 0.40 D or No. 3.5~4: Vmin. 1.00, VCmin. 0.70 D or No. 5.5: Vmin. 1.50, VCmin. 1.00 D or No. 6~10: Vmin. 2.00, VCmin. 1.50 ⊗ Regarding DorNo.=2~3, 4.5, 5 and 13, Vmin. is the machining limit, and VC cannot be used.	
 SVC	SVC	Extend the flat section SV to the bottom. SVC is only available for single face cutting in the upper position of four flats cutting. When P<1···›Available for L=60 or less. When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

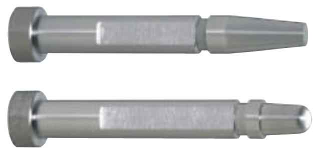
GAS RELEASE ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE—



Non JIS material definition is listed on P.1351 - 1352

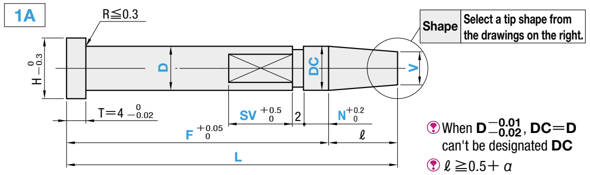
RoHS



M / H	Type	Step	Shape	T: D · DC	T: A · V
NAK80 37～43HRC	GV−CPN−	1A 1B 1C 1D	Not processed C G T R B	−0.01 −0.02	±0.015
DH2F 38～42HRC	GV−CPF−				
SKD61 equivalent 48～52HRC	GV−CPD−				
SKH51 equivalent 58～60HRC	GV−CPX−				
NAK80 37～43HRC	GV−CPK−			0 −0.005	±0.01
DH2F 38～42HRC	GV−CPG−				
SKD61 equivalent 48～52HRC	GV−CPP−				
SKH51 equivalent 58～60HRC	GV−CPH−				

Step type selected from 1A～1D below

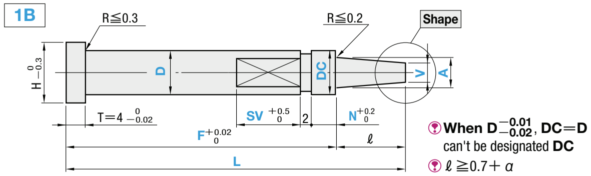
1A



Shape: Select a tip shape from the drawings on the right.

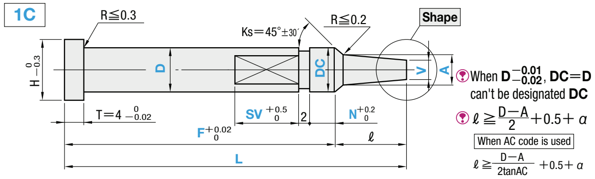
- When D $^{-0.01}_{-0.02}$, **DC=D** can't be designated **DC**
- ℓ≧0.5+ α

1B



- **When D $^{-0.01}_{-0.02}$, DC=D** can't be designated **DC**
- ℓ≧0.7+ α

1C

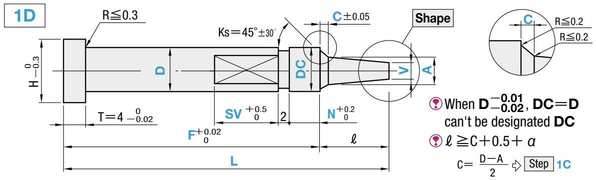


- When D $^{-0.01}_{-0.02}$, **DC=D** can't be designated **DC**
- $\ell \geqq \frac{D-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC}+0.5+\alpha$

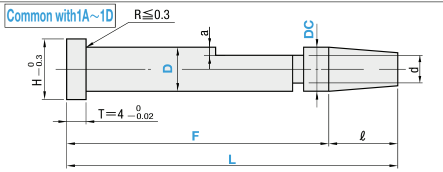
1D



- When D $^{-0.01}_{-0.02}$, **DC=D** can't be designated **DC**
- ℓ≧C+0.5+ α

$C=\frac{D-A}{2}$ ⇨ Step 1C

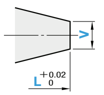
Common with1A～1D



D	d	a
1～ 2.5	D−0.2	0.1
3～ 4	D−0.4	0.2
4.5～ 5	D−0.6	0.3
5.5～13	D−1.0	0.5

Shape (Tip shape: V is dimension before tip processing.)

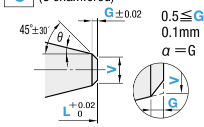
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

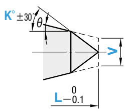
α =0

C (C chamfered)



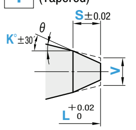
0.5≦G<V/2
0.1mm increments
α =G θ <45°

G (Cone)



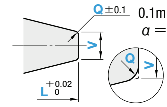
20<K≦60
1° increments
$\alpha = \frac{V}{2\tan K}$ θ <K

T (Tapered)



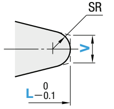
$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments
10≦K≦45
1° increments
α =S θ <K

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α =Q

B (Spherical processed)



α =V/2

(Calculation of tip gradient θ ☞ **P.1315**)

H	Part Number: Type	Step	Shape	D	0.01mm increments: L	F	A	Vmin.	0.1mm increments: C	0.005mm increments: DC	0.1mm increments: N	0.5mm increments: SV	ℓmax.
3	GV−CPN− GV−CPF− GV−CPD− GV−CPX− GV−CPK− GV−CPG− GV−CPP− GV−CPH−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ～ 100.00	14.50 ～ L−ℓmin. ℓmin. Refer to the Step drawing	DC>A≧V Step 1A DC>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	(D−0.08)≦DC≦D When D $^{-0.01}_{-0.02}$, can't be designated **DC** When **DC=D, DCX** is applied.	0.3～10.0	2.0～50.0	15.00
				1.5							F−(2+SV+N)≧10		20.00
4				2									25.00
5				2.5									30.00
6				3				0.70					35.00
7				3.5	16.50 ～ 120.00			1.00			0.5～15.0	2.0～60.0	40.00
				4							F−(2+SV+N)≧10		45.00
8				4.5									50.00
				5									
9				5.5				1.50					
				6				2.00					
10				7									
11				8									
15				10									
18				13									

Order

Part Number	L	F	A	V	C	Tip size (K·S·G·Q)	DC(DCX)	N	SV
GV−CPN−1A 5	58.00	F40.00		V4.50				N2	SV10
GV−CPG−1BR6	46.00	F38.00	A5.00	V3.00		Q1.0	DCX	N4	SV15
GV−CPP−1CC5	54.50	F48.35	A4.50	V4.30		G0.5	DC4.990	N2	SV20
GV−CPH−1DG6	50.00	F40.00	A5.10	V3.00	C0.3	K40	DC5.960	N4	SV10

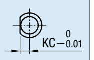
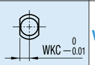
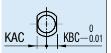
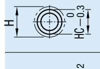
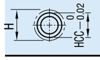
Days to Ship Quotation

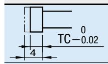
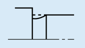
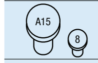
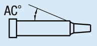
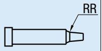
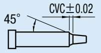
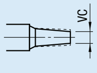
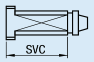
Price Quotation

Alterations

Part Number	L	F	A	V(VC)	C(CVC)	(Tip size) (K·S·G·Q)	DC(DCX)	N	SV(SVC)	(KC · WKC···etc.)
GV−CPG−1BC6	50.00	F40.00	A5.00	V3.10		G1.0	DCX	N4	SV10	HC8.0
GV−CPP−1A 5	58.00	F50.00		V4.00			DC4.990	N2	SV15	NHC−23

Alteration details ☞ P.441

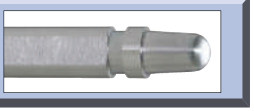
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3		

Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order ☞ **P.442** Available when H≧2	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with RR · CVC not available. 1D, C≦1.0,A+2(C×tanAC)<D	Quotation
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (Strength has been improved) Designation method RR Available for Step 1B/1C/1D D−A≧1.0 Step When 1D, C≧0.5	
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(D−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦50 (D×5 for Step 1A) DC>A≧VC ⊗ Regarding D=2～3, 4.5, 5 and 13, Vmin. is the machining limit, and VC cannot be used.	
	SVC	Extend the flat section SV to the bottom. GV−CPN− · Available for GV−CPK−only D≧2 When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

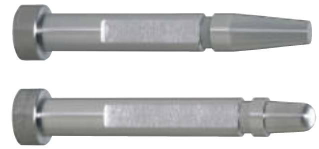
D	Vmin.	VCmin.
1～1.5	0.50	0.40
3.5～4	1.00	0.70
5.5	1.50	1.00
6～10	2.00	1.50

GAS RELEASE ONE-STEP CORE PINS

—SHAFT DIAMETER (P) DESIGNATION TYPE—



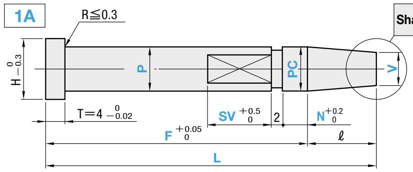
RoHS



M / H	Type	Step	Shape	P · PC	A · V
NAK80 37～43HRC	GV−CPNB−	1A 1B 1C 1D	Not processed C G T R B	−0.01 −0.02	±0.015
DH2F 38～42HRC	GV−CPFB−				
SKD61 equivalent 48～52HRC	GV−CPDB−				
SKH51 equivalent 58～60HRC	GV−CPXB−				
NAK80 37～43HRC	GV−CPKB−			0 −0.005	±0.01
DH2F 38～42HRC	GV−CPGB−				
SKD61 equivalent 48～52HRC	GV−CPPB−				
SKH51 equivalent 58～60HRC	GV−CPHB−				

Step type selected from 1A～1D below

1A

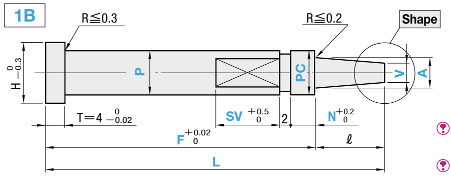


Shape Select a tip shape from the drawings on the right.

When $P^{-0.01}_{-0.02}$, PC=P
PC designation not available

ℓ≧0.5+α

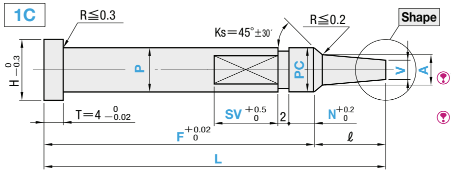
1B



When $P^{-0.01}_{-0.02}$, PC=P
PC designation not available

ℓ≧0.7+α

1C



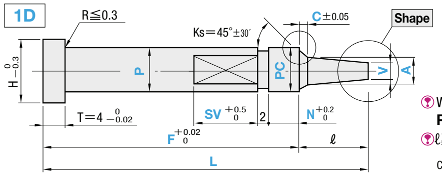
When $P^{-0.01}_{-0.02}$, PC=P
PC designation not available

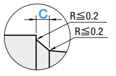
$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC}+0.5+\alpha$

1D



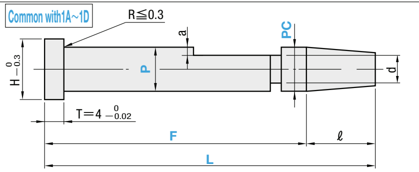


When $P^{-0.01}_{-0.02}$, PC=P
PC designation not available

ℓ≧C+0.5+α

$C=\frac{P-A}{2}$ ⇨ Step 1C

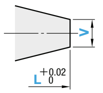
Common with1A～1D



P	d	a
0.80～ 0.99	P−0.1	0.05
1.00～ 2.49	P−0.2	0.1
2.50～ 3.99	P−0.4	0.2
4.00～ 4.99	P−0.6	0.3
5.00～12.99	P−1.0	0.5

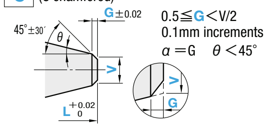
Shape (Tip shape: V is dimension before tip processing.)

(Not processed) Designation of the shape is unnecessary when tip processing is not required.



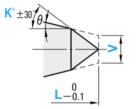
α=0

C (C chamfered)



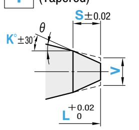
0.5≦G<V/2
0.1mm increments
α=G θ<45°

G (Cone)



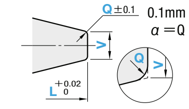
20<K≦60
1° increments
$\alpha=\frac{V}{2\tan K}$ θ<K

T (Tapered)



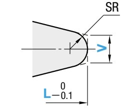
$0.1 \leqq S < \frac{V}{2\tan K}$
0.1mm increments
10≦K≦45
1° increments
α=S θ<K

R (R chamfered)



0.2≦Q<V/2
0.1mm increments
α=Q

B (Spherical processed)



α=V/2

(Calculation of tip gradient θ ☞ P.1315)

Non JIS material definition is listed on P.1351 - 1352

H	Type	Step	Shape	No.	L (0.01mm increments)	P (0.01mm increments)	F (0.01mm increments)	A (0.01mm increments)	Vmin. (0.01mm increments)	C (0.1mm increments)	PC (0.005mm increments)	N (0.1mm increments)	SV (0.5mm increments)	ℓmax.
3	GV−CPNB− GV−CPFB− GV−CPDB− GV−CPXB− GV−CPKB− GV−CPGB− GV−CPPB− GV−CPHB−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ～ 100.00	0.80～ 0.99	14.50 ～ L−ℓmin. ℓmin. Refer to the Step drawing	PC>A≧V Step 1A PC>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	(P−0.08)≦PC≦P When $P^{-0.01}_{-0.02}$, can't be designated PC When PC=P, PCX is applied.	0.3～10.0	2.0～50.0 F−(2+SV+N)≧10	15.00
				1.5		1.00～ 1.49								20.00
4				2		1.50～ 1.99								25.00
5				2.5		2.00～ 2.49								30.00
6				3		2.50～ 2.99			0.70					35.00
7				3.5	16.50 ～ 120.00	3.00～ 3.49			1.00			0.5～15.0	2.0～60.0 F−(2+SV+N)≧10	40.00
				4		3.50～ 3.99								45.00
8				4.5		4.00～ 4.49								50.00
				5		4.50～ 4.99								
9				5.5		5.00～ 5.49			1.50					
				6		5.50～ 5.99			2.00					
10				7		6.00～ 6.99								
11				8		7.00～ 7.99								
15				10		8.00～ 9.99								
18				13		10.00～12.99								

Order

Part Number	L	P	F	A	V	C	Tip size (K·S·G·Q)	PC(PCX)	N	SV
GV−CPNB−1A 5	52.60	P4.95	F44.00		V4.50				N2	SV20
GV−CPHB−1BR4	45.00	P3.90	F35.00	A3.00	V2.60		Q0.2	PCX	N8	SV15
GV−CPGB−1CC5.5	45.00	P5.49	F30.50	A5.00	V4.50		G1.2	PC5.450	N10	SV8.5
GV−CPPB−1DG6	45.50	P5.78	F37.50	A5.00	V3.10	C0.3	K40	PC5.740	N5	SV20

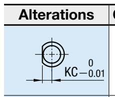
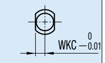
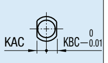
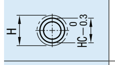
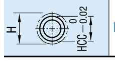
Days to Ship Quotation

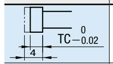
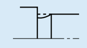
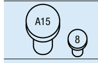
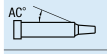
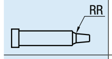
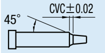
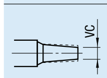
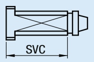
Price Quotation

Alterations

Part Number	L	P	F	A	V(VC)	C(CVC)	(Tip size) (K·S·G·Q)	PC(PCX)	N	SV(SVC)	(KC · WKC···etc.)
GV−CPHB−1BR4	45.00	P3.90	F35.00	A3.00	V2.60		Q0.2	PCX	N8	SV15	HC6.5
GV−CPGB−1CC5.5	45.00	P5.49	F30.50	A5.00	V4.50		G1.2	PC5.450	N10	SV8.5	NHC−23

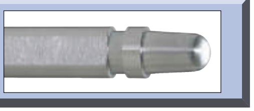
Alteration details ☞ P.441

Alterations	Code	Spec.		1Code
 KC $^{0}_{-0.01}$	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC $^{0}_{-0.01}$	WKC	Two flats cutting P/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 H HC $^{0}_{-0.3}$	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
 H HCC $^{0}_{-0.02}$	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3		

Alterations	Code	Spec.	1Code
 TC $^{0}_{-0.02}$ 4	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
 A15 8	NHC	Numbering on the head How to order ☞ **P.442** Available when H≧2	
 AC°	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with RR · CVC not available. When Step 1D, C≦1.0,A+2(C×tanAC)<P	Quotation
 RR	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (Strength has been improved) Designation method RR Available for Step 1B/1C/1D P−A≧1.0 When Step 1D, C≧0.5	
 45° CVC±0.02	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(P−A)/2 ⊗ Combination with AC not available.	
 VC	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦50 (P×5 for Step 1A). PC>A≧VC No. / Vmin. / VCmin.: 1～1.5 / 0.50 / 0.40; 3.5～4 / 1.00 / 0.70; 5.5 / 1.50 / 1.00; 6～10 / 2.00 / 1.50 ⊗ Regarding No.=2～3, 4.5, 5 and 13, Vmin. is the machining limit, and VC cannot be used.	
 SVC	SVC	Extend the flat section SV to the bottom. GV−CPNB− · Available for GV−CPKB−only, P≧2 When P<1 ···▸ Available for L=60 or less When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

PRECISION GAS RELEASE ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.005mm INCREMENTS) TYPE—



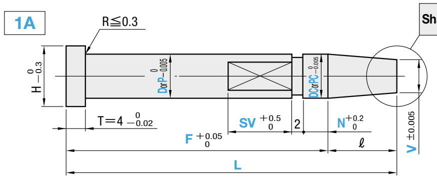
Non JIS material definition is listed on P.1351 - 1352

RoHS

M H	Type: Shaft diameter (D) selection type	Type: Shaft diameter (P) designation type	Step	Shape
SKD61 equivalent 48～52HRC	GV－CPZ－	GV－CPZB－	1A 1B 1C 1D	Not processed C G T R B
SKH51 equivalent 58～60HRC	GV－CPV－	GV－CPVB－		

Step type selected from 1A～1D below

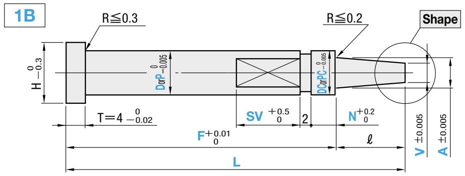
1A


R≦0.3
H $^{0}_{-0.3}$
DorP $^{0}_{-0.005}$
DCorPC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F $^{+0.05}_{0}$
ℓ
L
V ±0.005

Shape	Select a tip shape from the drawings on the right.

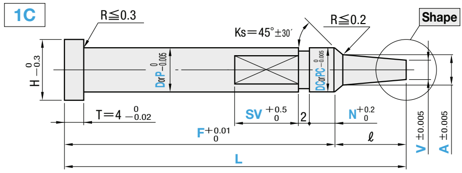
ℓ≧0.5+ α

1B


R≦0.3
R≦0.2
Shape
H $^{0}_{-0.3}$
DorP $^{0}_{-0.005}$
DCorPC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F $^{+0.01}_{0}$
ℓ
L
V ±0.005
A ±0.005

ℓ≧0.7+ α

1C

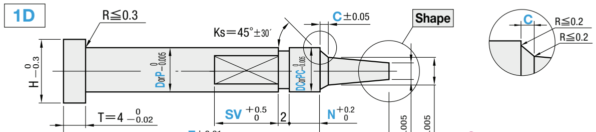

R≦0.3
Ks=45°±30′
R≦0.2
Shape
H $^{0}_{-0.3}$
DorP $^{0}_{-0.005}$
DCorPC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F $^{+0.01}_{0}$
ℓ
L
V ±0.005
A ±0.005

$\ell \geqq \frac{(DorP)-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{(DorP)-A}{2\tan AC}+0.5+\alpha$

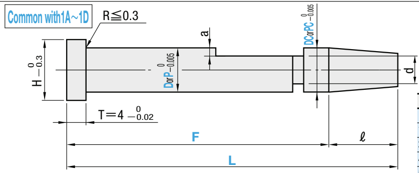
1D


R≦0.3
Ks=45°±30′
C±0.05
Shape
C
R≦0.2
R≦0.2
H $^{0}_{-0.3}$
DorP $^{0}_{-0.005}$
DCorPC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F $^{+0.01}_{0}$
ℓ
L
V ±0.005
A ±0.005

ℓ≧C+0.5+ α

$C=\frac{(DorP)-A}{2}$ ⇨ Step 1C

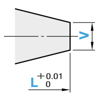
Common with1A～1D


R≦0.3
a
DCorPC $^{0}_{-0.005}$
H $^{0}_{-0.3}$
DorP $^{0}_{-0.005}$
d
T=4 $^{0}_{-0.02}$
F
ℓ
L

D	P	d	a
—	0.800～ 0.995	P−0.1	0.05
1 ～ 2.5	1.000～ 2.495	(DorP)−0.2	0.1
3 ～ 4	2.500～ 3.995	(DorP)−0.4	0.2
4.5～ 5	4.000～ 4.995	(DorP)−0.6	0.3
5.5～13	5.000～12.995	(DorP)−1.0	0.5

Shape (Tip shape: V is dimension before tip processing.)

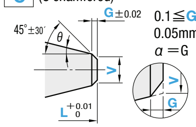
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

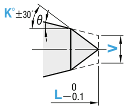
α =0

C (C chamfered)


45°±30′
θ
G±0.02
V
L $^{+0.01}_{0}$
V
G

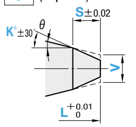
0.1≦G<V/2
0.05mm increments
α =G θ <45°

G (Cone)



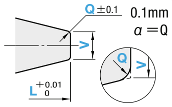
20<K≦60
1 ° increments
$\alpha=\frac{V}{2\tan K}$ θ <K

T (Tapered)


K°±30′
θ
S±0.02
V
L $^{+0.01}_{0}$

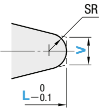
$0.1\leqq S<\frac{V}{2\tan K}$
0.05mm increments
10≦K≦45
1 ° increments
α =S θ <K

R (R chamfered)


Q±0.1
V
L $^{+0.01}_{0}$
Q
V

0.2≦Q<V/2
0.1mm increments
α =Q

B (Spherical processed)



α =V/2

(Calculation of tip gradient θ ☞ P.1315)

■Shaft diameter (D) selection type

H	Part Number: Type	Step	Shape	D	0.01mm increments: L	F	A	Vmin.	0.1mm increments: C	0.005mm increments: DC	0.1mm increments: N	0.5mm increments: SV	ℓmax.
3	GV−CPZ− GV−CPV−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ～ 100.00	14.50 ～ L−ℓmin. ℓmin. Refer to the Step drawing	DC>A≧V Step 1A DC>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	(D−0.08)≦DC≦D When DC=D, DCX is applied.	0.3 ～ 10.0	2.0 ～ 50.0	A×6 (Step 1A =D×6) and 50.00
				1.5									
4				2									
5				2.5							F−(2+SV+N)≧10		
6				3				0.70					
7				3.5	16.50 ～ 120.00			1.00			0.5 ～ 15.0	2.0 ～ 60.0	
				4									
8				4.5									
				5									
9				5.5				1.50					
				6				2.00			F−(2+SV+N)≧10		
10				7									
11				8									
15				10									
18				13									

■Shaft diameter (P) designation type

H	Part Number: Type	Step	Shape	No.	0.01mm increments: L	0.005mm increments: P	0.01mm increments: F	A	Vmin.	0.1mm increments: C	0.005mm increments: PC	0.1mm increments: N	0.5mm increments: SV	ℓmax.
3	GV−CPZB− GV−CPVB−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ～ 100.00	0.800～ 0.995	14.50 ～ L−ℓmin. ℓmin. Refer to the Step drawing	PC>A≧V Step 1A PC>V No designation necessary for A	0.50	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.1≦CVC≦1.00	(P−0.08)≦PC≦P When PC=P, PCX is applied.	0.3 ～ 10.0	2.0 ～ 50.0	A×6 (Step 1A =P×6) and 50.00
				1.5		1.000～ 1.495								
4				2		1.500～ 1.995								
5				2.5		2.000～ 2.495						F−(2+SV+N)≧10		
6				3		2.500～ 2.995			0.70					
7				3.5	16.50 ～ 120.00	3.000～ 3.495			1.00			0.5 ～ 15.0	2.0 ～ 60.0	
				4		3.500～ 3.995								
8				4.5		4.000～ 4.495								
				5		4.500～ 4.995								
9				5.5		5.000～ 5.495			1.50					
				6		5.500～ 5.995			2.00			F−(2+SV+N)≧10		
10				7		6.000～ 6.995								
11				8		7.000～ 7.995								
15				10		8.000～ 9.995								
18				13		10.000～12.995								

Order

Part Number	L	P	F	A	V	C	(Tip size) (K·S·G·Q)	DC(DCX) PC(PCX)	N	SV
GV−CPZ −1A 5	58.00		F40.00		V4.50			DC4.990	N2	SV10
GV−CPVB−1BR6	46.00	P5.500	F38.00	A5.00	V3.00		Q1.0	PCX	N4	SV15

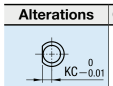
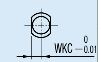
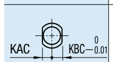
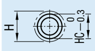
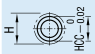
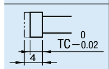
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	F(FC)	A	V(VC)	C(CVC)	(Tip size) (K·S·G·Q)	DC(DCX) PC(PCX)	N	SV(SVC)	(KC · WKC···etc.)
GV−CPV −1BC6	50.00		F40.00	A5.00	V3.10		G1.0	DCX	N4	SV10	HC8.0
GV−CPZB−1A 5	58.00	P4.995	F50.00		V4.00			PC4.990	N2	SV15	NHC−23

Alteration details ☞ P.441

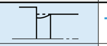
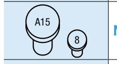
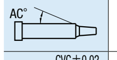
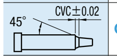
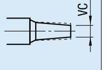
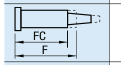
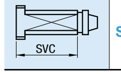
Alterations	Code	Spec.	1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2	Quotation
	WKC	Two flats cutting (D or P)/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	

KC $^{0}_{-0.01}$
WKC $^{0}_{-0.01}$
KAC
KBC $^{0}_{-0.01}$
H
HC $^{0}_{-0.3}$
H
HCC $^{0}_{-0.02}$
TC $^{0}_{-0.02}$
4

About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter
Unit of designation
Shaft diameter (D) selection type 0.05mm increments possible
Shaft diameter (P) designation type 0.0025mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

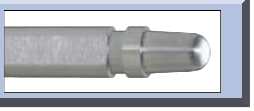
Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order ☞ P.442 Available when H≧2	
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC not available. 1D, C≦1.0,A+2(C×tanAC)<(D or P)	Quotation
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 Available for Step 1D CVC<[(DorP−A)]/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦50 (Step 1A, (DorP)×5) (DC or PC)>A≧VC ⊗ Regarding DorNo.=2～3, 4.5, 5 and 13, Vmin. is the machining limit, and VC cannot be used.	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm It can be designated up to Lmin.=6.5mm.	
	SVC	Extend the flat section SV to the bottom. When P<1 ···▸Available for L=60 or less When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

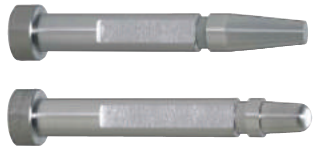
A15
8
AC°
45°
CVC±0.02
VC
FC
F
SVC

D or No.	Vmin.	VCmin.
1～1.5	0.50	0.40
3.5～4	1.00	0.70
5.5	1.50	1.00
6～10	2.00	1.50

EXTRA PRECISION GAS RELEASE ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER (P) DESIGNATION (0.001mm INCREMENTS) TYPE—

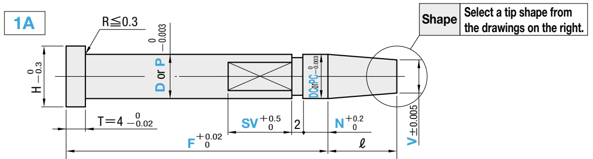




M H	Part Number			
	Type		Step	Shape
	Shaft diameter (D) selection type	Shaft diameter (P) designation type		
SKH51 equivalent 58～60HRC	GV−CPM−	GV−CPMB−	1A 1B 1C 1D	Not processed C G T R B

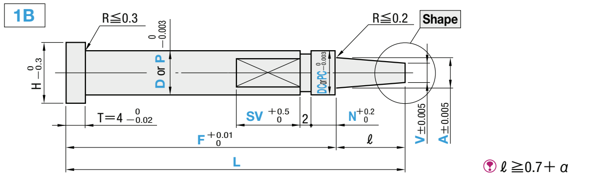
Step type selected from 1A～1D below

1A



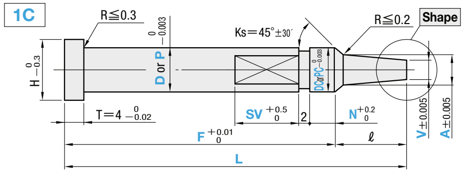
$\ell \geqq 0.5+\alpha$

1B



$\ell \geqq 0.7+\alpha$

1C

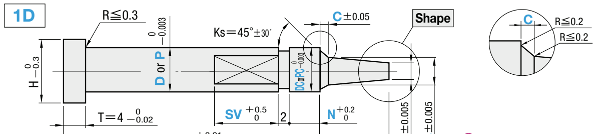


$\ell \geqq \frac{(DorP)-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{(DorP)-A}{2\tan AC}+0.5+\alpha$

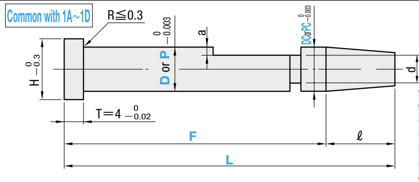
1D



$\ell \geqq C+0.5+\alpha$

$C=\frac{(DorP)-A}{2}$ ⇨ Step 1C

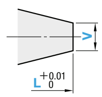
Common with 1A～1D



D	P	d	a
—	0.800～ 0.999	P−0.1	0.05
1 ～ 2.5	1.000～ 2.499	(D or P)−0.2	0.1
3 ～ 4	2.500～ 3.999	(D or P)−0.4	0.2
4.5～ 5	4.000～ 4.999	(D or P)−0.6	0.3
5.5～13	5.000～12.999	(D or P)−1.0	0.5

Shape (Tip shape: V is dimension before tip processing.)

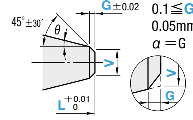
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

$\alpha=0$

C (C chamfered)

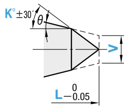


$0.1\leqq G<V/2$

0.05mm increments

$\alpha=G \quad \theta<45°$

G (Cone)

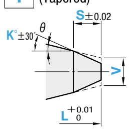


$20<K\leqq 60$

1° increments

$\alpha=\frac{V}{2\tan K} \quad \theta<K$

T (Tapered)



$0.1\leqq S<\frac{V}{2\tan K}$

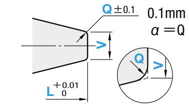
0.05mm increments

$10\leqq K\leqq 45$

1° increments

$\alpha=S \quad \theta<K$

R (R chamfered)

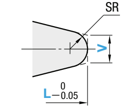


$0.2\leqq Q<V/2$

0.1mm increments

$\alpha=Q$

B (Spherical processed)



$\alpha=V/2$

(Calculation of tip gradient θ ☞ **P.1315**)

Non JIS material definition is listed on P.1351 - 1352

■Shaft diameter (D) selection type

H	Part Number				0.01mm increments		0.005mm increments		0.1mm increments	0.001mm increments	0.1mm increments	0.5mm increments	ℓmax.
	Type	Step	Shape	D	L	F	A	Vmin.	C	DC	N	SV	
3	GV−CPM−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ～ 60.00	14.50 ～ L−ℓmin. ℓmin. Refer to the Step drawing	DC>A≧V Step 1A DC>V No designation necessary for A	0.500	only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	(D−0.08)≦DC≦D When DC=D, DCX is applied.	0.3～10.0 F−(2+SV+N)≧10	2.0～50.0	A×6 (Step 1A D×6) and 50.00
				1.5									
4				2									
5				2.5									
6				3				0.700					
7				3.5				1.000			0.5～15.0 F−(2+SV+N)≧10	2.0～60.0	
				4									
8				4.5									
				5									
9				5.5				1.500					
				6				2.000					
10				7									
11				8									
15				10									
18				13									

■Shaft diameter (P) designation type

H	Part Number				0.01mm increments	0.001mm increments	0.01mm increments	0.005mm increments		0.1mm increments	0.001mm increments	0.1mm increments	0.5mm increments	ℓmax.
	Type	Step	Shape	No.	L	P	F	A	Vmin.	C	PC	N	SV	
3	GV−CPMB−	1A 1B 1C 1D	Designation is unnecessary when tip processing is not required. C G T R B	1	16.50 ～ 60.00	0.800～ 0.999	14.50 ～ L−ℓmin. ℓmin. Refer to the Step drawing	PC>A≧V Step 1A PC>V No designation necessary for A	0.500	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.1≦CVC≦1.00	(P−0.08)≦PC≦P When PC=P, PCX is applied.	0.3 ～ 10.0 F−(2+SV+N)≧10	2.0 ～ 50.0	A×6 (Step 1A =P×6) and 50.00
				1.5		1.000～ 1.499								
4				2		1.500～ 1.999								
5				2.5		2.000～ 2.499								
6				3		2.500～ 2.999			0.700					
7				3.5		3.000～ 3.499			1.000			0.5 ～ 15.0 F−(2+SV+N)≧10	2.0 ～ 60.0	
				4		3.500～ 3.999								
8				4.5		4.000～ 4.499								
				5		4.500～ 4.999								
9				5.5		5.000～ 5.499			1.500					
				6		5.500～ 5.999			2.000					
10				7		6.000～ 6.999								
11				8		7.000～ 7.999								
15				10		8.000～ 9.999								
18				13		10.000～12.999								

Order

Part Number	L	P	F	A	V	C	Tip size (K·S·G·Q)	DC(DCX) PC(PCX)	N	SV
GV−CPM −1A 5	52.60		F44.00		V4.500			DC4.940	N2	SV20
GV−CPMB−1BR4	45.00	P3.900	F35.00	A3.000	V2.600		Q0.2	PCX	N8	SV15

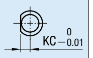
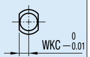
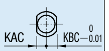
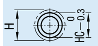
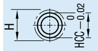
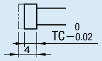
Days to Ship Quotation

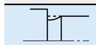
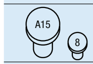
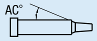
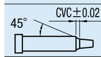
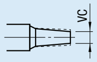
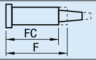
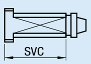
Price Quotation

Alterations

Part Number	L	P	F(FC)	A	V(VC)	C(CVC)	(Tip size) (K·S·G·Q)	DC(DCX) PC(PCX)	N	SV(SVC)	(KC · WKC···etc.)
GV−CPM −1BR4	45.00		F35.00	A3.000	V2.600		Q0.2	DCX	N8	SV15	HC6.5
GV−CPMB−1CC5.5	45.00	P5.490	F30.50	A5.000	V4.500		G1.2	PC5.450	N10	SV8.5	NHC−23

Alteration details ☞ P.441

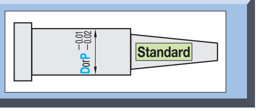
Alterations	Code	Spec.		1Code
 KC 0 −0.01	KC	Single flat cutting (D or P)/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection type 0.05mm increments possible Shaft diameter (P) designation type 0.0005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
 WKC 0 −0.01	WKC	Two flats cutting (D or P)/2≦WKC<H/2		
 KAC KBC 0 −0.01	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 H HC 0 −0.3	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
 H HCC 0 −0.02	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3		
 TC 0 −0.02 4	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	Quotation
 A15 8	NHC	Numbering on the head How to order ☞ **P.442** Available when H≧2	
 AC°	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC not available. When 1D, C≦1.0,A+2(C×tanAC)<(D or P)	
 45° CVC±0.02	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 Available for Step 1D CVC<[(D or P−A)]/2 ⊗ Combination with AC not available.	
 VC	VC	Vmin. is enlarged. VC=0.005mm increments ℓ≦A×5,ℓ≦50 (Step 1A, (D or P)×5) (DC or PC)>A≧VC D or No. 1～1.5: Vmin. 0.500, VCmin. 0.400 D or No. 3.5～4: Vmin. 1.000, VCmin. 0.700 D or No. 5.5: Vmin. 1.500, VCmin. 1.000 D or No. 6～10: Vmin. 2.000, VCmin. 1.500 ⊗ Regarding D or No. =2～3·4.5·5and 13, Vmin. is the machining limit,and VC cannot be used.	
 FC F	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm It can be designated up to Lmin.=6.5mm.	
 SVC	SVC	Extend the flat section SV to the bottom. When P<1 ···›Available for L=60 or less When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

JIS head

ONE-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE／SHAFT DIAMETER(P)(0.01mm INCREMENTS)DESIGNATION・SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ TYPE—


DorP $^{-0.01}_{-0.02}$
Standard

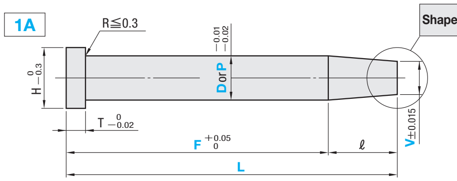
Non JIS material definition is listed on P.1351 - 1352

RoHS

M H	Type: Shaft diameter (D) selection type	Type: Shaft diameter (P) designation type	Step	Shape
SKD61 equivalent 48～52HRC	CPDJ—	CPDJB—	1A 1B 1C 1D 1E	Not processed C G T R B

Step type selected from 1A～1E below

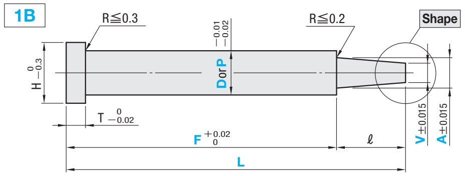
1A


R≦0.3
$^{-0.01}_{-0.02}$
DorP
H $^{0}_{-0.3}$
T $^{0}_{-0.02}$
F $^{+0.05}_{0}$
ℓ
V±0.015
L

Shape Select a tip shape from the drawings on the right.

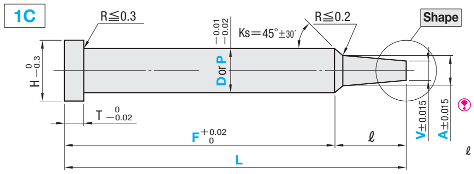
$\ell \geqq 0.5+\alpha$

1B


R≦0.3
R≦0.2
$^{-0.01}_{-0.02}$
DorP
H $^{0}_{-0.3}$
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
V±0.015
A±0.015
L
Shape

$\ell \geqq 0.7+\alpha$

1C

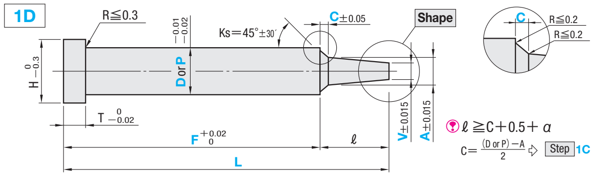

R≦0.3
R≦0.2
Ks=45°±30′
$^{-0.01}_{-0.02}$
DorP
H $^{0}_{-0.3}$
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
V±0.015
A±0.015
L
Shape

$\ell \geqq \frac{(D\ or\ P)-A}{2}+0.5+\alpha$

When AC code is used

$\ell \geqq \frac{(D\ or\ P)-A}{2\tan AC^\circ}+0.5+\alpha$

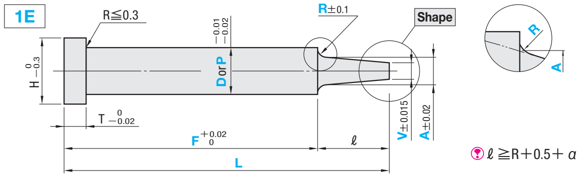
1D


R≦0.3
Ks=45°±30′
C±0.05
$^{-0.01}_{-0.02}$
DorP
H $^{0}_{-0.3}$
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
V±0.015
A±0.015
L
Shape
C
R≦0.2
R≦0.2

$\ell \geqq C+0.5+\alpha$

$C=\frac{(D\ or\ P)-A}{2}$ ⇨ Step 1C

1E

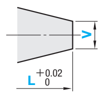

R≦0.3
R±0.1
$^{-0.01}_{-0.02}$
DorP
H $^{0}_{-0.3}$
T $^{0}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
V±0.015
A±0.02
L
Shape
R
A

$\ell \geqq R+0.5+\alpha$

Refer to the **Shape** drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

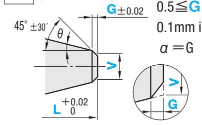
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

$\alpha=0$

C (C chamfered)

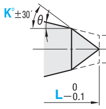

G±0.02
45°±30′
θ
V
L $^{+0.02}_{0}$
V
G

$0.5 \leqq G < V/2$

0.1mm increments

$\alpha = G \quad \theta < 45^\circ$

G (Cone)

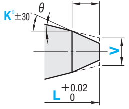


$20 < K \leqq 60$

1° increments

$\alpha = \frac{V}{2\tan K} \quad \theta < K$

T (Tapered)


S±0.02
K°±30′
θ
V
L $^{+0.02}_{0}$

$0.1 \leqq S < \frac{V}{2\tan K}$

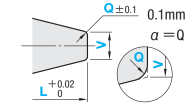
0.1mm increments

$10 \leqq K \leqq 45$

1° increments

$\alpha = S \quad \theta < K$

R (R chamfered)

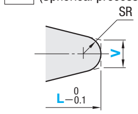

Q±0.1
V
L $^{+0.02}_{0}$
Q
V

$0.2 \leqq Q < V/2$

0.1mm increments

$\alpha = Q$

B (Spherical processed)



$\alpha = V/2$

(Calculation of tip gradient θ P.1315)

Order

Part Number	—	L	—	P	—	F	—	A	—	V	—	C・R	—	Tip size (K・S・G・Q)
CPDJ —1BR6	—	46.00			—	F38.00	—	A5.00	—	V3.00			—	Q1.0
CPDJB—1CC6	—	45.50	—	P5.49	—	F30.50	—	A5.00	—	V4.50			—	G1.5

■Shaft diameter (D) selection type

H	T	Part Number: Type	Step	Shape	D	0.01mm increments: L min.	L max.	F min.	F max.	A	Vmin.	0.1mm increments: C	R	ℓmax.
8	6	CPDJ—	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	4	40.00	120.00	30.00	L−ℓmin. ℓmin. Refer to the Step drawing	D＞A≧V Step 1A D＞V No designation necessary for A	1.00	Only Step 1D designated $C<\frac{D-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{D-A}{2}$ and R≧0.2	45.00
					4.5									50.00
9					5									
					5.5						1.50			
10					6						2.00			
11					6.5									
					7									
13	8				8									
15					10									

■Shaft diameter (P) designation type

H	T	Part Number: Type	Step	Shape	No.	0.01mm increments: L min.	L max.	min. P max.	F min.	F max.	A	Vmin.	0.1mm increments: C	R	ℓmax.
8	6	CPDJB—	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	4	40.00	120.00	3.50～3.99	30.00	L−ℓmin. ℓmin. Refer to the Step drawing	P＞A≧V Step 1A P＞V No designation necessary for A	1.00	Only Step 1D designated $C<\frac{P-A}{2}$ and ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00	Only Step 1E designated $R \leqq \frac{P-A}{2}$ and R≧0.2	45.00
9					5			4.00～4.99							50.00
10					6			5.00～5.99				2.00			
13	8				8			6.00～7.99							
15					10			8.00～9.99							

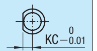
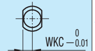
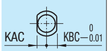
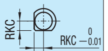
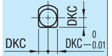
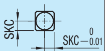
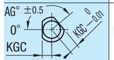
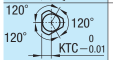
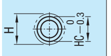
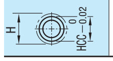
Price Quotation

Days to Ship Quotation

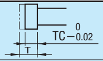
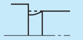
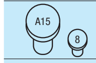
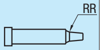
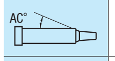
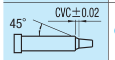
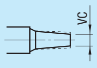
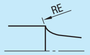
Alterations

Part Number	—	L	—	P	—	F	—	A	—	V(VC)	—	C(CVC)	—	R(RE)	—	Tip size (K·S·G·Q)	—	(KC・WKC···etc.)
CPDJ —1EC6	—	50.00			—	F40.00	—	A5.00	—	V3.10			—	RE1.5	—	G1.0	—	HC8.0
CPDJB—1EC6	—	50.00	—	P5.70	—	F40.00	—	A5.00	—	V3.10			—	RE1.5	—	G1.0	—	HC8.0

Alteration details P.441

Alterations	Code	Spec.		1Code
	KC	Single flat cutting (D or P)/2≦KC＜H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation Shaft diameter (D) selection type 0.5mm increments possible Shaft diameter (P) designation type 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting (D or P)/2≦WKC＜H/2		
	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2		
	RKC	Two flats (right angled) cutting (D or P)/2≦RKC＜H/2		
	DKC	Three flats cutting (D or P)/2≦DKC＜H/2		Quotation
	SKC	Four flats cutting (D or P)/2≦SKC＜H/2		
	KGC	Two flats (angled) cutting (D or P)/2≦KGC＜H/2 0＜AG＜360 AG=1° increments		
	KTC	Three flats cutting at 120° (D or P)/2≦KTC＜H/2		
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC＜H−0.3		

KC $^{0}_{-0.01}$
WKC $^{0}_{-0.01}$
KAC
KBC $^{0}_{-0.01}$
RKC
RKC $^{0}_{-0.01}$
DKC
DKC
DKC $^{0}_{-0.01}$
SKC
SKC $^{0}_{-0.01}$
AG° ±0.5
0°
KGC
KGC $^{0}_{-0.01}$
120°
120°
120°
KTC $^{0}_{-0.01}$
H
HC $^{0}_{-0.3}$
H
HCC $^{0}_{-0.02}$

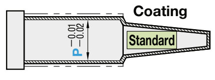
Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments T/2≦TC＜T (Dimensions L and F remain unchanged.) T−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 ⊗ Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5. (Strength has been improved) Designation method RR Available for Step 1B/1C/1D (D or P)−A≧1.0 Step When 1D, C≧0.5	Quotation
	AC	Changes the standard angle (Ks=45°) AC=1° increments Available for Step 1C/1D 30≦AC≦60 ⊗ Combination with CVC・RR not available Step When 1D, C≦1.0,A+2(C×tanAC°)＜(D or P)	
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC＜[(D or P)−A]/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦50((D or P)×5) for Step 1A (D or P)＞A≧VC ⊗ Regarding D.=4.5・5, =Vmin. is the machining limit, and VC cannot be used.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step 1E	

T
TC $^{0}_{-0.02}$
A15
8
RR
AC°
45°
CVC±0.02
VC
RE

D or No.	$V_{min.}$	$VC_{min.}$
4	1.00	0.70
5.5	1.50	1.00
6～10	2.00	1.50

COATED ONE-STEP CORE PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) • TiCN COATING—



Non JIS material definition is listed on P.1351 - 1352

RoHS

M SKD61 equivalent
H 48~52HRC

■Guide for TiCN Coating

- TiCN coating, applied through PVD (physical vapor deposition), features excellent abrasion and corrosion resistance properties, and improves mold-release performance.

Hardness	3000HV~
Coating thickness	2~5μm
Color	Blue-gray

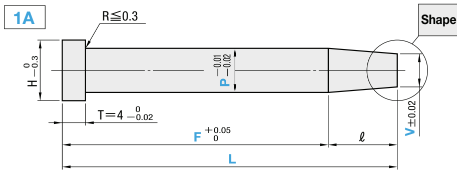
- Coating made on the tip and shaft.

The dimensions and tolerances shown in the drawings are the values after the product is coated.
The thickness of coating layer may be slightly inconsistent around the tip corners.

Step type selected from 1A~1E below

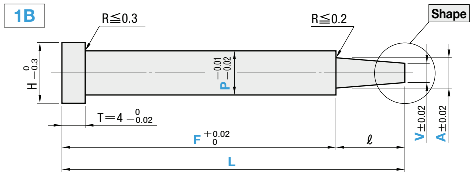
1A

Shape Select a tip shape from the drawings on the right.



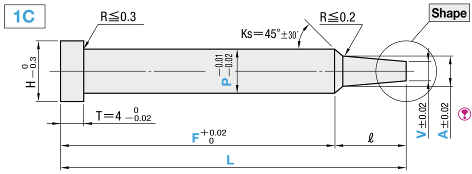
$\ell \geqq 0.5+\alpha$

1B



$\ell \geqq 0.7+\alpha$

1C

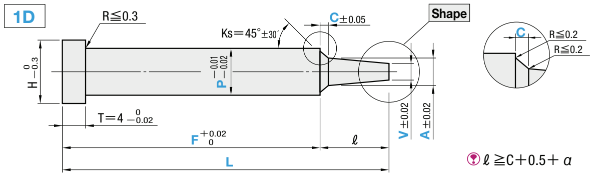


$\ell \geqq \frac{P-A}{2}+0.5+\alpha$

When AC code is used

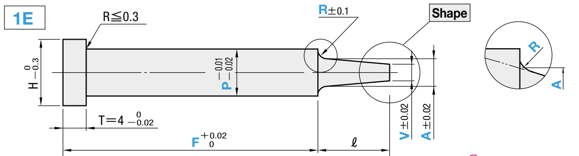
$\ell \geqq \frac{P-A}{2tanAC}+0.5+\alpha$

1D



$\ell \geqq C+0.5+\alpha$

1E

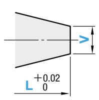


$\ell \geqq R+0.5+\alpha$

Refer to the **Shape** drawing for L tolerance

Shape (Tip shape: V is dimension before tip processing.)

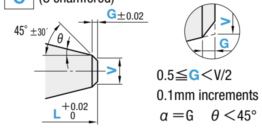
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

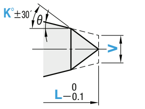
$\alpha=0$

C (C chamfered)



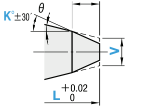
$0.5 \leqq G < V/2$
0.1mm increments
$\alpha=G \quad \theta<45°$

G (Cone)



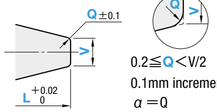
$20<K \leqq 60$
1° increments
$\alpha=\frac{V}{2tanK} \quad \theta<K$

T (Tapered)



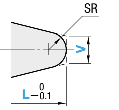
$0.1 \leqq S < \frac{V}{2tanK}$
0.1mm increments
$20 \leqq K \leqq 45$
1° increments
$\alpha=S \quad \theta<K$

R (R chamfered)



$0.2 \leqq Q < V/2$
0.1mm increments
$\alpha=Q$

B (Spherical processed)



$\alpha=V/2$

(Calculation of tip gradient θ ☞ **P.1315**)

H	Part Number				0.01mm increments					0.1mm increments	ℓmax.
	Type	Step	Shape	No.	L	P	F	A	Vmin.	C・R	
7	H−CPDB	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	3.5	12.00~120.00	3.00~ 3.49	F≧10.00	P>A≧V Step 1A P>V No designation necessary for A	1.00	$C<\frac{P-A}{2}$ ※0.1≦C≦4.0 ※When CVC code is used 0.50≦CVC≦1.00 (Only Step 1D designated) $R \leqq \frac{P-A}{2}$ R≧0.2 (Only Step 1E designated)	40.00
				4		3.50~ 3.99					45.00
8				4.5		4.00~ 4.49					50.00
				5		4.50~ 4.99					
9				5.5		5.00~ 5.49			1.50		
				6		5.50~ 5.99			2.00		
10				6.5		6.00~ 6.49					
				7		6.50~ 6.99					
11				8		7.00~ 7.99					
15				10		8.00~ 9.99					
18				13		10.00~12.99					
21				16		13.00~15.99					
25				20	30.00~120.00	16.00~19.99	F≧28.00		5.00		

Order

Part Number		L		P		F		A		V		C・R		Tip size (K・S・G・Q)
H−CPDB1BC5	—	50.00	—	P4.70	—	F40.00	—	A3.50	—	V3.00			—	G1.0
H−CPDB1EG6	—	60.00	—	P5.90	—	F45.00	—	A5.00	—	V3.00	—	R0.4	—	K45

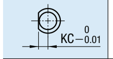
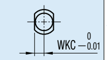
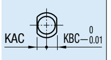
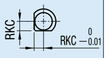
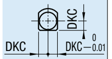
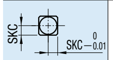
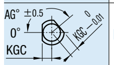
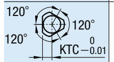
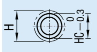
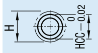
Days to Ship Quotation

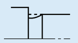
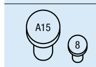
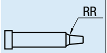
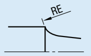
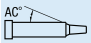
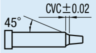
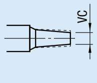
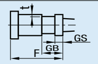
Price Quotation

Alterations

Part Number		L		P		F		A		V(VC)		C(CVC)		R(RE)		Tip size (K・S・G・Q)		(KC・WKC…etc.)
H−CPDB1EG6	—	38.00	—	P5.70	—	F29.00	—	A3.00	—	V2.50			—	R0.3	—	K45	—	HC8.0

Alteration details ☞ P.441

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order ☞ **P.442** ⊗ Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3~0.5 (Improves strength) Available for Step 1B/1C/1D Step 1B・1C : P−A≧1.0 Step 1D : C≧0.5	
	RE	R shape alteration(enlargement) RE=0.5mm increments 0.5≦RE≦2.0 Available for Step 1E only	Quotation
	AC	Changes the standard angle(Ks=45°). AC=1° increments 30≦AC≦60 Available for Step 1C・1D ⊗ Combination with CVC RR not available. Step 1D : C≦1.0,A+2(C×tanAC)<P	
	CVC	C dimension can be designated at 0.01mm increments. 0.50≦CVC≦1.00 Available for Step 1D CVC<(P−A)/2 ⊗ Combination with AC not available.	
	VC	Vmin. is enlarged. VC=0.01mm increments ℓ≦A×5,ℓ≦50 (P×5 for Step 1A) P>A≧VC ⊗ Regarding No.3.5~5・13・16, Vmin. is the machining limit,and VC cannot be used.	
	GVC	Gas vent machining GS・GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ **P.442**	

No.	Vmin.	VCmin.
4	1.50	1.00
6~10	2.00	1.50
20	5.00	4.00

FREE SPECIFIED ONE-STEP CORE PINS

—NO COATING · TiCN COATING—

RoHS

Part Number		M	H HRC	T					A · V	
				P	L		F			
No coating	TiCN Coating						Step 1A	Step 1B · 1C · 1D · 1E	No coating	TiCN Coating
F−CPDB	HF−CPDB	SKD61 equivalent	48～52	$^{-0.01}_{-0.02}$	$^{+0.02}_{0}$	When Shape G Shape B $^{0}_{-0.1}$	$^{+0.05}_{0}$	$^{+0.02}_{0}$	※±0.015	±0.02
F−CPHB	—	SKH51 equivalent	58～60	$^{0}_{-0.005}$	$^{+0.02}_{0}$		$^{+0.05}_{0}$	$^{+0.02}_{0}$	※±0.01	—

※ When Step 1E, A±0.02

■Guide for TiCN Coating

- TiCN coating, applied through PVD (physical vapor deposition), features excellent abrasion and corrosion resistance properties, and improves mold-release performance.

Hardness	3000HV～
Coating thickness	2～5μm
Color	Blue-gray

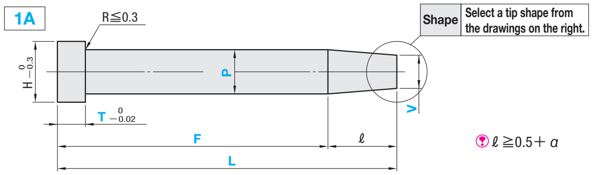
- Coating made on the tip and shaft.

The dimensions and tolerances shown in the drawings are the values after the product is coated.

The thickness of coating layer may be slightly inconsistent around the tip corners.

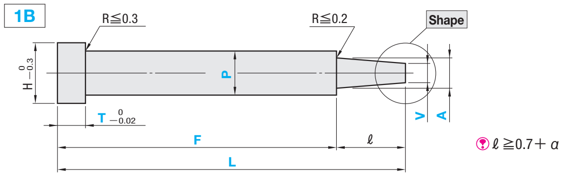
Step type selected from 1A～1E below

1A



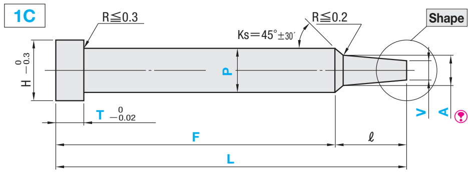
$ℓ ≧ 0.5+α$

1B



$ℓ ≧ 0.7+α$

1C

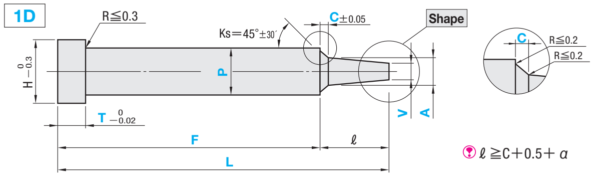


$ℓ ≧ \frac{P-A}{2}+0.5+α$

When AC code is used

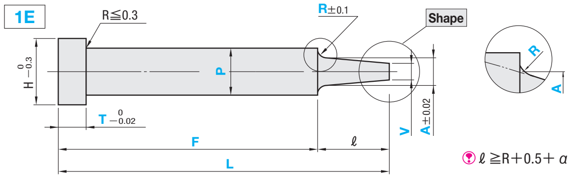
$ℓ ≧ \frac{P-A}{2\tan AC}+0.5+α$

1D



$ℓ ≧ C+0.5+α$

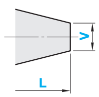
1E



$ℓ ≧ R+0.5+α$

Shape (Tip shape: V is dimension before tip processing.)

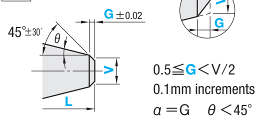
(Not processed)



Designation of the shape is unnecessary when tip processing is not required.

$α=0$

C (C chamfered)

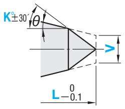


0.5≦G<V/2

0.1mm increments

$α=G \quad θ<45°$

G (Cone)

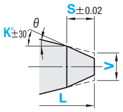


20<K≦60

1° increments

$α=\frac{V}{2\tan K} \quad θ<K$

T (Tapered)



$0.1≦S<\frac{V}{2\tan K}$

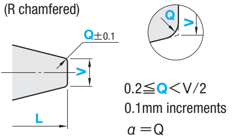
0.1mm increments

20<K≦45

1° increments

$α=S \quad θ<K$

R (R chamfered)

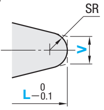


0.2≦Q<V/2

0.1mm increments

$α=Q$

B (Spherical processed)



$α=V/2$

(Calculation of tip gradient θ P.1315)

Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments			0.1mm increments	0.01mm increments		0.1mm increments	ℓmax.
	Type	Step	Shape	No.	L	P	F	T	A	Vmin.	C · R	
3	F−CPDB F−CPHB	1A 1B 1C 1D 1E	Designation is unnecessary when tip processing is not required. C G T R B	3	20.00～120.00	1.00～ 1.50	F≧T+10	1.5≦T≦20.0 (When HF−CPDB1 is selected T≧4.0)	P>A≧V Step 1A P>V No designation necessary for A	0.50	$C<\frac{P-A}{2}$ 0.1≦C≦4.0 (Available for Step 1D only)	20.00
4				4		1.00～ 2.00				0.70		
5				5		1.50～ 2.50						25.00
6				6		2.00～ 3.00				1.00		30.00
7				7		2.50～ 3.50						35.00
8	F−CPDB F−CPHB —TiCN coating— HF−CPDB (No.≧8)			8		3.50～ 5.00				1.50		40.00
9				9		4.50～ 6.00				2.00 (When 5.00≦P≦5.49 is selected 1.50)	$R≦\frac{P-A}{2}$ R≧0.2 (Available for Step 1E only)	50.00
10				10		5.50～ 7.00						
11				11		6.50～ 8.00						
15				15		7.50～10.00						
18				18		9.50～13.00				2.50		
21				21		12.50～16.00						
25				25	30.00～120.00	16.50～20.00	F≧T+24			5.00		

Order

Part Number	L	P	F	T	A	V	C · R	Tip size (K·S·G·Q)
F−CPHB1DB15	80.00	P9.70	F60.00	T10.5	A8.00	V6.00	C0.3	
HF−CPDB1DB8	50.00	P4.60	F40.00	T8.2	A3.80	V3.00	C0.3	

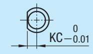
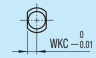
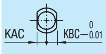
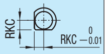
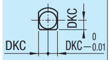
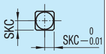
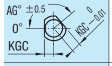
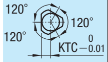
Days to Ship Quotation

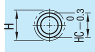
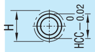
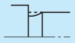
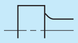
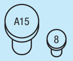
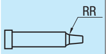
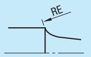
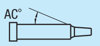
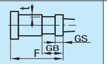
Price Quotation

Alterations

Part Number	L	P	F	T	A	V	C	R(RE)	Tip size (K·S·G·Q)	(KC · WKC···etc.)
HF−CPDB1EG9	38.00	P5.70	F29.00	T10.0	A3.00	V2.50		R0.3	K45	HC8.0

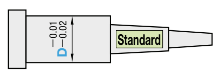
Alteration details P.441

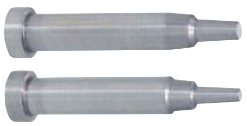
Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TRN	Relief under the head (No need for plate chamfering)	
	TRC	Changes the head R from R0.3 or lower to R0.3～0.5.	
	NHC	Numbering on the head How to order P.442 Available when H≧2 ⊗ Combination with SKC not available.	
	RR	Changes R (normally 0.2 or less) to R0.3～0.5 (Improves strength) Available for Step 1B/1C/1D Step 1B · 1C : P−A≧1.0 Step 1D : C≧0.5	
	RE	R shape alteration(enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step 1E only	
	AC	Changes the standard angle(Ks=45°). AC=1° increments 30≦AC≦60 Available for Step 1C · 1D ⊗ Combination with RR not available. Step 1D : C≦1.0,A+2(C×tanAC)<P	
	GVC	Gas vent machining GS · GB=1mm increments Available when P P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

TWO-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION • SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ TYPE—


D $^{-0.01}_{-0.02}$
Standard

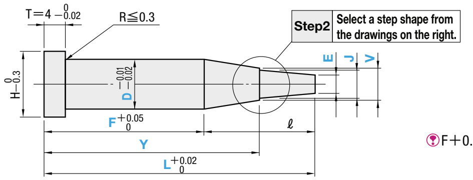


RoHS

Part Number			
Step 1	Material code	M H	Step 2
CA CB CC CD CE	N	NAK80 37～43HRC	A B C D E
	F	DH2F 38～42HRC	
	D	SKD61 equivalent 48～52HRC	
	X	SKH51 equivalent 58～60HRC	
	A	MAS1C 50～54HRC	

Step1 (shape for first step) select from CA～CE below

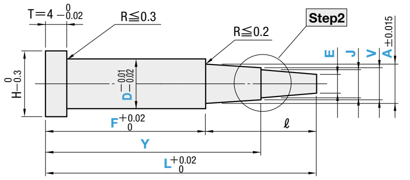
CA


T=4 $^{0}_{-0.02}$
R≦0.3
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
E
J
V
F $^{+0.05}_{0}$
ℓ
Y
L $^{+0.02}_{0}$

Step2 Select a step shape from the drawings on the right.

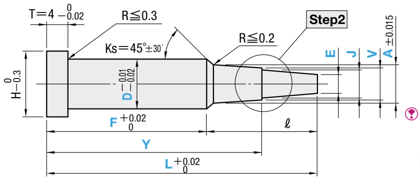
$F+0.5 \leqq Y$

CB


T=4 $^{0}_{-0.02}$
R≦0.3
R≦0.2
Step2
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
E
J
V
A ±0.015
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$

$F+0.7 \leqq Y$

CC

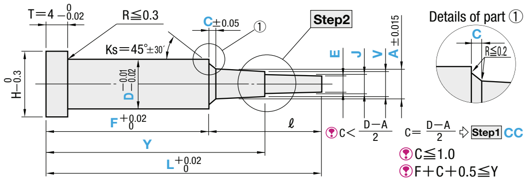

T=4 $^{0}_{-0.02}$
R≦0.3
Ks=45°±30′
R≦0.2
Step2
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
E
J
V
A ±0.015
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$

$F+\frac{D-A}{2}+0.5 \leqq Y$

When AC code is used

$F+\frac{D-A}{2\tan AC}+0.5 \leqq Y$

CD

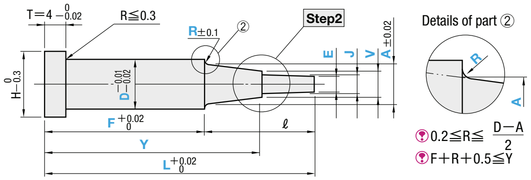

T=4 $^{0}_{-0.02}$
R≦0.3
C±0.05
①
Ks=45°±30′
Step2
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
E
J
V
A ±0.015
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$
Details of part ①
C
R≦0.2

$C<\frac{D-A}{2}$　$C=\frac{D-A}{2}$ ⇨ Step1 CC

$C \leqq 1.0$

$F+C+0.5 \leqq Y$

CE


T=4 $^{0}_{-0.02}$
R≦0.3
R±0.1
②
Step2
H $^{0}_{-0.3}$
D $^{-0.01}_{-0.02}$
E
J
V
A ±0.02
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$
Details of part ②
R
A

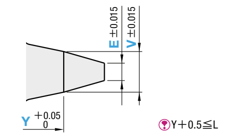
$0.2 \leqq R \leqq \frac{D-A}{2}$

$F+R+0.5 \leqq Y$

Step2 (shape for second step)

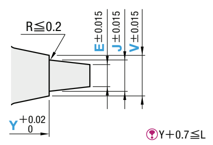
A

(Designation of V=Epossible)


E ±0.015
V ±0.015
Y $^{+0.05}_{0}$

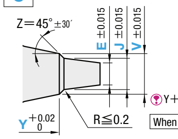
$Y+0.5 \leqq L$

B


R≦0.2
E ±0.015
J ±0.015
V ±0.015
Y $^{+0.02}_{0}$

$Y+0.7 \leqq L$

C

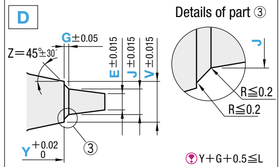

Z=45°±30′
E ±0.015
J ±0.015
V ±0.015
Y $^{+0.02}_{0}$
R≦0.2

$Y+\frac{V-J}{2}+0.5 \leqq L$

When AGC code is used

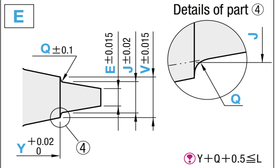
$Y+\frac{V-J}{2\tan AGC}+0.5 \leqq L$

D


Details of part ③
G±0.05
Z=45°±30′
E ±0.015
J ±0.015
V ±0.015
Y $^{+0.02}_{0}$
③
J
R≦0.2
R≦0.2

$Y+G+0.5 \leqq L$

E


Details of part ④
Q±0.1
E ±0.015
J ±0.02
V ±0.015
Y $^{+0.02}_{0}$
④
J
Q

$Y+Q+0.5 \leqq L$

Refer to the Step2 drawing for Y tolerance

"MAS1C" will be discontinued when stocked materials are finished.

Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments								0.1mm increments				ℓmax.
					L		F	Y	A	V	J	Emin.	C	R	G	Q	
	Step1	Material	Step2	D	min.	max.											
3	CA CB CC CD CE	N F D X A (D≦4)	A B C D E	1	12.00	100.00	F≧10.00	Refer to the working limits shown in the drawing	D>A≧V When Step1 CA is selected, no designation is necessary for A	A≧V>J When Step1 CA is selected, D>V>J Designation of V=E possible when Step2 A is selected.	V>J≧E No need to designate J when Step2 A is selected.	0.50	Only Step1 CD is designated 0.1≦C≦1.0 and $C<\frac{D-A}{2}$	Only Step1 CE is designated R≧0.2 and $R \leqq \frac{D-A}{2}$	Only Step2 D is designated 0.1≦G≦0.5 and $G<\frac{V-J}{2}$	Only Step2 E is designated Q≧0.2 and $Q \leqq \frac{V-J}{2}$	15.00
				1.5													20.00
4				2								0.70					25.00
5				2.5													30.00
6				3								1.00					35.00
7				3.5													40.00
				4		120.00											45.00
8				4.5								1.50					60.00
				5													
9				5.5													
				6								2.00					
10				6.5													
				7													
11				8													
15				10													
18				13								2.50					
21				16													
25		D X		20	30.00		F≧28.00					5.00					

Order

Part Number	L	F	Y	A	V	J	E	C・R	G・Q
CANA 5	56.50	F48.00	Y52.00		V4.20		E2.80		
CCDD 5.5	49.95	F35.00	Y40.00	A4.50	V4.30	J3.50	E3.20		G0.3
CENE 6	55.75	F43.50	Y48.76	A5.00	V4.80	J3.80	E3.00	R0.4	Q0.4

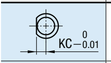
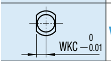
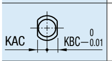
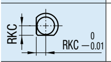
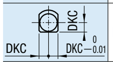
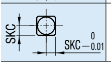
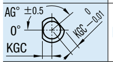
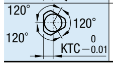
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	F	Y	A	V	J	E	C・R	G・Q	(KC・WKC…etc.)
CEFA5	56.50	F48.00	Y52.00	A4.20	V4.10		E2.80	R0.3		RKC2.4

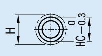
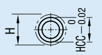
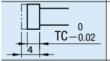
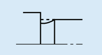
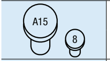
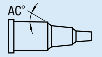
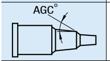
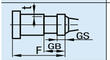
Alteration details ☞ P.441

Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2	
	WKC	Two flats cutting D/2≦WKC<H/2	
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	Quotation
 DKC DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting D/2≦DKC<H/2	
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting D/2≦SKC<H/2	
 AG° ±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting

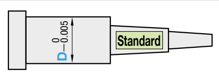
(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	Quotation
	NHC	Numbering on the head How to order ☞ P.442 Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle(Ks=45°). AC=1° increments Available for Step1 CC/CD 30≦AC≦60 When Step1 CD : A+2(C×tanAC)<D	
	AGC	Changes the standard angle (Z=45°). AGC=1° increments Available for Step2 1C/1D 30≦AGC≦60 When Step2 D : J+2(G×tanAGC)<V	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order ☞ P.442	

TWO- STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION ・ SHAFT DIAMETER TOLERANCE $_{-0.005}^{\ 0}$ TYPE—


D $_{-0.005}^{0}$
Standard

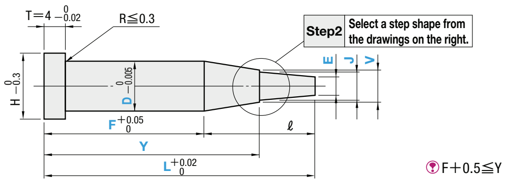
❢ When exceeding the machining limit of tip (ℓ) dimension (Refer to the following drawings Step1・Step2)・・・▸ "Tip (ℓ) Short two-step Core Pins" **Details are published online.**

❢ Non JIS material definition is listed on P.1351 - 1352

Part Number			
Step 1	Material code	M H	Step 2
CA CB CC CD CE	K	NAK80 37～43HRC	A B C D E
	G	DH2F 38～42HRC	
	P	SKD61 equivalent 48～52HRC	
	H	SKH51 equivalent 58～60HRC	
	W	SUS440C 56～60HRC	
	Y	MAS1C 50～54HRC	

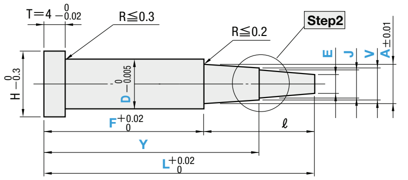
Step1 (shape for first step) select from CA～CE below

CA


T=4 $_{-0.02}^{0}$
R≦0.3
Step2 Select a step shape from the drawings on the right.
H $_{-0.3}^{0}$
D $_{-0.005}^{0}$
E
J
V
F $_{0}^{+0.05}$
ℓ
Y
L $_{0}^{+0.02}$

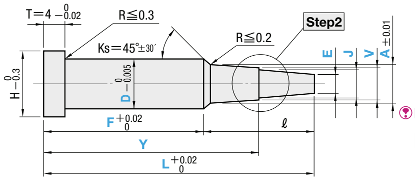
❢ F+0.5≦Y

CB


T=4 $_{-0.02}^{0}$
R≦0.3
R≦0.2
Step2
H $_{-0.3}^{0}$
D $_{-0.005}^{0}$
E
J
V
A±0.01
F $_{0}^{+0.02}$
ℓ
Y
L $_{0}^{+0.02}$

❢ F+0.7≦Y

CC

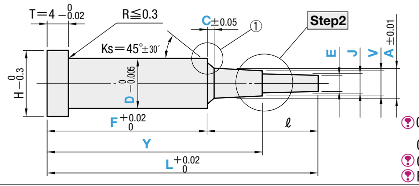

T=4 $_{-0.02}^{0}$
R≦0.3
Ks=45°±30′
R≦0.2
Step2
H $_{-0.3}^{0}$
D $_{-0.005}^{0}$
E
J
V
A±0.01
F $_{0}^{+0.02}$
ℓ
Y
L $_{0}^{+0.02}$

❢ $F+\frac{D-A}{2}+0.5≦Y$

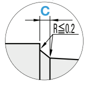
When AC code is used

$F+\frac{D-A}{2\tan AC}+0.5≦Y$

CD


T=4 $_{-0.02}^{0}$
R≦0.3
C±0.05
①
Ks=45°±30′
Step2
H $_{-0.3}^{0}$
D $_{-0.005}^{0}$
E
J
V
A±0.01
F $_{0}^{+0.02}$
ℓ
Y
L $_{0}^{+0.02}$

Details of part ①



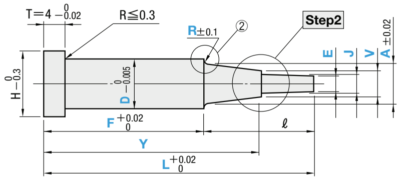
❢ $C<\frac{D-A}{2}$

$C=\frac{D-A}{2}$ ⇨ Step1 CC

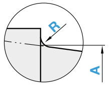
❢ C≦1.0

❢ F+C+0.5≦Y

CE


T=4 $_{-0.02}^{0}$
R≦0.3
R±0.1
②
Step2
H $_{-0.3}^{0}$
D $_{-0.005}^{0}$
E
J
V
A±0.02
F $_{0}^{+0.02}$
ℓ
Y
L $_{0}^{+0.02}$

Details of part ②



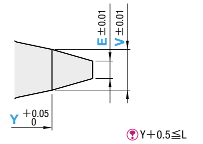
❢ $0.2≦R≦\frac{D-A}{2}$

❢ F+R+0.5≦Y

Step2 (shape for second step)

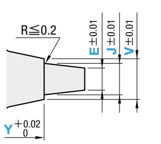
A

(Designation of V=Epossible)


E±0.01
V±0.01
Y $_{0}^{+0.05}$

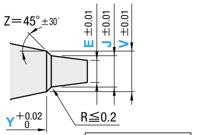
❢ Y+0.5≦L

B


R≦0.2
E±0.01
J±0.01
V±0.01
Y $_{0}^{+0.02}$

❢ Y+0.7≦L

C

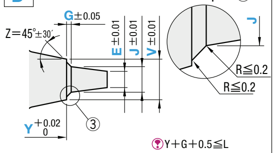

Z=45°±30′
E±0.01
J±0.01
V±0.01
Y $_{0}^{+0.02}$
R≦0.2

When AGC code is used

❢ $Y+\frac{V-J}{2}+0.5≦L$ $Y+\frac{V-J}{2\tan AGC}+0.5≦L$

D

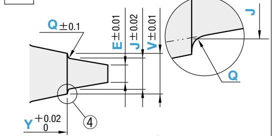
Details of part ③


G±0.05
Z=45°±30′
E±0.01
J±0.01
V±0.01
Y $_{0}^{+0.02}$
③
J
R≦0.2
R≦0.2

❢ Y+G+0.5≦L

E

Details of part ④


Q±0.1
E±0.01
J±0.02
V±0.01
Y $_{0}^{+0.02}$
④
J
Q

❢ Y+Q+0.5≦L

❢ Refer to the Step2 drawing for Y tolerance

❢ "MAS1C" will be discontinued when stocked materials are finished.

H	Part Number				0.01mm increments								0.1mm increments				ℓmax.
	Step1	Material	Step2	D	L min.	L max.	F	Y	A	V	J	Emin.	C	R	G	Q	
3	CA CB CC CD CE	K G P H W Y (D≦4)	A B C D E	1	12.00	100.00	F≧10.00	Refer to the working limits shown in the drawing	D>A≧V When Step1 CA is selected, no designation is necessary for A.	A≧V>J When Step1 CA is selected, D>V>J Designation of V=E possible when Step2 A is selected.	V>J≧E No need to designate J when Step2 A is selected.	0.50	Only Step1 CD is designated 0.1≦C≦1.0 and $C<\frac{D-A}{2}$	Only Step1 CE is designated R≧0.2 and $R≦\frac{D-A}{2}$	Only Step2 D is designated 0.1≦G≦0.5 and $G<\frac{V-J}{2}$	Only Step2 E is designated Q≧0.2 and $Q≦\frac{V-J}{2}$	15.00
				1.5													20.00
4				2								0.70					25.00
5				2.5													30.00
6				3								1.00					35.00
7				3.5													40.00
				4		120.00											45.00
8				4.5								1.50					60.00
				5		120.00											
9				5.5													
				6								2.00					
10				6.5													
				7													
11				8		Only C□H□ 150.00											
15				10													
18				13								2.50					
21				16													
25		P H		20	30.00		F≧28.00					5.00					

Order

Part Number	L	F	Y	A	V	J	E	C・R	G・Q
CAKA 5	56.50	F48.00	Y52.00		V4.20		E2.80		
CCPD 5.5	49.95	F35.00	Y40.00	A4.50	V4.30	J3.50	E3.20		G0.3
CEWE 6	55.75	F43.50	Y48.76	A5.00	V4.80	J3.80	E3.00	R0.4	Q0.4

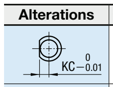
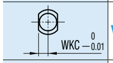
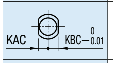
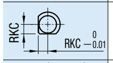
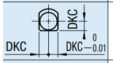
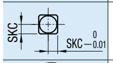
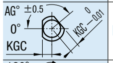
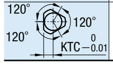
Days to Ship Quotation

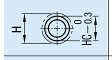
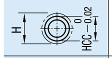
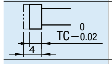
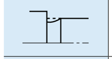
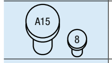
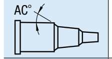
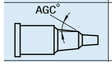
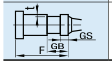
Price Quotation

Alterations

Part Number	L	F	Y	A	V	J	E	C・R	G・Q	(KC・WKC···etc.)
CEHA5	56.50	F48.00	Y52.00	A4.20	V4.10		E2.80	R0.3		RKC2.4

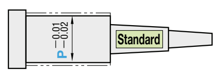
Alteration details P.441

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
 KAC KBC $_{-0.01}^{0}$	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $_{-0.01}^{0}$	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
 DKC DKC DKC $_{-0.01}^{0}$	DKC	Three flats cutting D/2≦DKC<H/2		
 SKC SKC $_{-0.01}^{0}$	SKC	Four flats cutting D/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC $_{-0.01}^{0}$	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments		
 120° 120° 120° KTC $_{-0.01}^{0}$	KTC	Three flats cutting at 120° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments ❢ D≦HC<H ❢ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 ❢ Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle(Ks=45°). AC=1° increments ❢ Available for Step1 CC/CD ❢ 30≦AC≦60 ❢ When Step1 CD : A+2(C×tanAC)<D	
	AGC	Changes the standard angle (Z=45°). AGC=1° increments ❢ Available for Step2 1C/1D ❢ 30≦AGC≦60 ❢ When Step2 D : J+2(G×tanAGC)<V	
	GVC	Gas vent machining GS・GB=1mm increments ❢ Available when D≧2 ❢ 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

TWO- STEP CORE PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) • SHAFT DIAMETER TOLERANCE $^{-0.01}_{-0.02}$ TYPE—

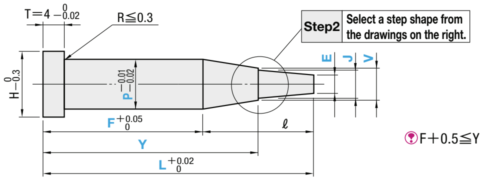

P $^{-0.01}_{-0.02}$
Standard

RoHS

Part Number			
Step 1	Material code	M H	Step 2
CA CB CC CD CE	NB	NAK80 37～43HRC	A B C D E
	FB	DH2F 38～42HRC	
	DB	SKD61 equivalent 48～52HRC	
	XB	SKH51 equivalent 58～60HRC	
	AB	MAS1C 50～54HRC	

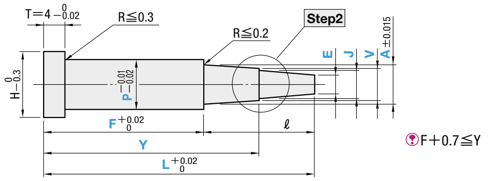
Step1 (shape for first step) select from CA～CE below

CA


T=4 $^{0}_{-0.02}$
R≦0.3
Step2 Select a step shape from the drawings on the right.
H $^{0}_{-0.3}$
P $^{-0.01}_{-0.02}$
E
J
V
F $^{+0.05}_{0}$
ℓ
Y
L $^{+0.02}_{0}$

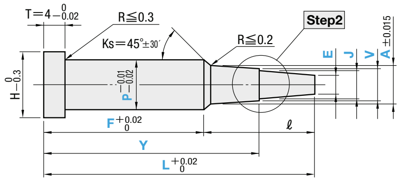
$F+0.5≦Y$

CB


T=4 $^{0}_{-0.02}$
R≦0.3
R≦0.2
Step2
E
J
V
A±0.015
H $^{0}_{-0.3}$
P $^{-0.01}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$

$F+0.7≦Y$

CC

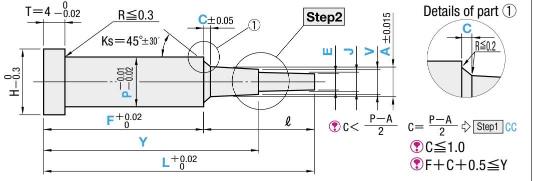

T=4 $^{0}_{-0.02}$
R≦0.3
Ks=45°±30′
R≦0.2
Step2
E
J
V
A±0.015
H $^{0}_{-0.3}$
P $^{-0.01}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$

$F+\frac{P-A}{2}+0.5≦Y$

When AC code is used

$F+\frac{P-A}{2\tan AC°}+0.5≦Y$

CD

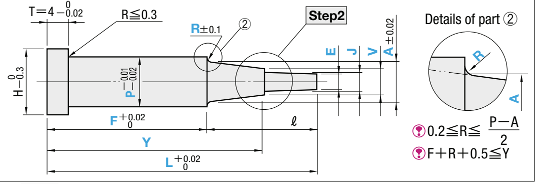

T=4 $^{0}_{-0.02}$
R≦0.3
C±0.05
①
Ks=45°±30′
Step2
E
J
V
A±0.015
H $^{0}_{-0.3}$
P $^{-0.01}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$
Details of part ①
C
R≦0.2

$C<\frac{P-A}{2}$ $C=\frac{P-A}{2}$ ⇨ Step1 CC

$C≦1.0$

$F+C+0.5≦Y$

CE


T=4 $^{0}_{-0.02}$
R≦0.3
R±0.1
②
Step2
E
J
V
A±0.02
H $^{0}_{-0.3}$
P $^{-0.01}_{-0.02}$
F $^{+0.02}_{0}$
ℓ
Y
L $^{+0.02}_{0}$
Details of part ②
R
A

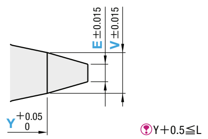
$0.2≦R≦\frac{P-A}{2}$

$F+R+0.5≦Y$

Step2 (shape for second step)

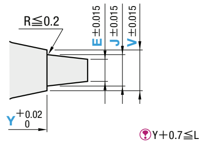
A

(Designation of V=Epossible)


E±0.015
V±0.015
Y $^{+0.05}_{0}$

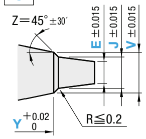
$Y+0.5≦L$

B


R≦0.2
E±0.015
J±0.015
V±0.015
Y $^{+0.02}_{0}$

$Y+0.7≦L$

C

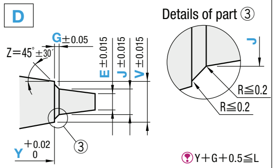

Z=45°±30′
E±0.015
J±0.015
V±0.015
Y $^{+0.02}_{0}$
R≦0.2

$Y+\frac{V-J}{2}+0.5≦L$

When AGC code is used

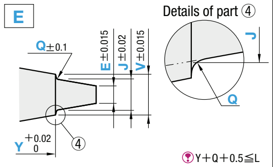
$Y+\frac{V-J}{2\tan AGC°}+0.5≦L$

D


Details of part ③
G±0.05
Z=45°±30′
E±0.015
J±0.015
V±0.015
Y $^{+0.02}_{0}$
③
J
R≦0.2
R≦0.2

$Y+G+0.5≦L$

E


Details of part ④
Q±0.1
E±0.015
J±0.02
V±0.015
Y $^{+0.02}_{0}$
④
J
Q

$Y+Q+0.5≦L$

Refer to the Step2 drawing for Y tolerance

"MAS1C" will be discontinued when stocked materials are finished.

Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments										0.1mm increments				ℓmax.
	Step1	Material	Step2	No.	L min.	L max.	min. P max.	F	Y	A	V	J	Emin.	C	R	G	Q	
3	CA CB CC CD CE	NB FB DB XB AB (P≦3.99)	A B C D E	1.5	12.00	100.00	1.00～ 1.49	F≧10.00	Refer to the working limits shown in the drawing	P>A≧V When Step1 CA is selected, no designation is necessary for A	A≧V>J When Step1 CA is selected, P>V>J Designation of V=E possible when Step2 A is selected.	V>J≧E No need to designate J when Step2 A is selected.	0.50	Only Step1 CD is designated 0.1≦C≦1.0 and $C<\frac{P-A}{2}$	Only Step1 CE is designated R≧0.2 and $R≦\frac{P-A}{2}$	Only Step2 D is designated 0.1≦G≦0.5 and $G<\frac{V-J}{2}$	Only Step2 E is designated Q≧0.2 and $Q≦\frac{V-J}{2}$	20.00
4				2			1.50～ 1.99						0.70					25.00
5				2.5			2.00～ 2.49											30.00
6				3			2.50～ 2.99						1.00					35.00
7				3.5			3.00～ 3.49											40.00
				4		120.00	3.50～ 3.99											45.00
8				4.5			4.00～ 4.49						1.50					60.00
				5			4.50～ 4.99											
9				5.5			5.00～ 5.49											
				6			5.50～ 5.99						2.00					
10				6.5			6.00～ 6.49											
				7			6.50～ 6.99											
11				8			7.00～ 7.99											
15				10			8.00～ 9.99											
18				13			10.00～12.99						2.50					
21				16			13.00～15.99											
25		DB XB		20	30.00		16.00～19.99	F≧28.00					5.00					

Order

Part Number	L	P	F	Y	A	V	J	E	C・R	G・Q
CBFBB 6	62.10	P5.55	F42.00	Y53.25	A5.20	V4.70	J4.10	E3.50		
CDXBA 8	70.00	P7.25	F43.50	Y55.32	A5.00	V4.50		E4.00	C0.5	
CENBE 6	55.75	P5.98	F43.50	Y48.76	A5.00	V4.80	J3.80	E3.00	R0.4	Q0.4

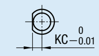
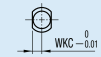
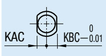
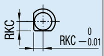
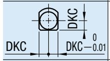
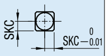
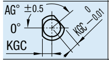
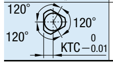
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	F	Y	A	V	J	E	C・R	G・Q	(KC・WKC···etc.)
CEFBA5	56.50	P4.80	F48.00	Y52.00	A4.20	V4.10		E2.80	R0.3		RKC2.4

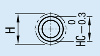
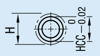
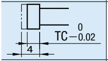
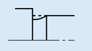
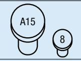
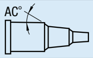
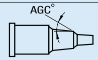
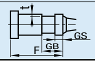
Alteration details P.441

Alterations	Code	Spec.	1Code
 KC $^{0}_{-0.01}$	KC	Single flat cutting P/2≦KC<H/2	
 WKC $^{0}_{-0.01}$	WKC	Two flats cutting P/2≦WKC<H/2	
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	Quotation
 DKC DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting P/2≦DKC<H/2	
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting P/2≦SKC<H/2	
 AG°±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° P/2≦KTC<H/2	

About Designation Unit for Key Flat Cutting

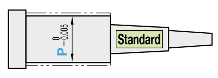
(1)To align the key flat with the shaft diameter
Unit of designation 0.005mm increments possible

(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

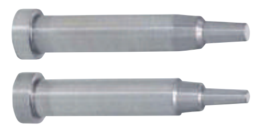
Alterations	Code	Spec.	1Code
 H HC $^{0}_{-0.3}$	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
 H HCC $^{0}_{-0.02}$	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
 TC $^{0}_{-0.02}$ 4	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	Quotation
 A15 8	NHC	Numbering on the head How to order P.442 Available when H≧2 ⊗ Combination with SKC not available.	
 AC°	AC	Changes the standard angle(Ks=45°). AC=1° increments Available for Step1 CC/CD 30≦AC≦60 When Step1 CD : A+2(C×tanAC)<P	
 AGC°	AGC	Changes the standard angle (Z=45°). AGC=1° increments Available for Step2 C/D 30≦AGC≦60 When Step2 D : J+2(G×tanAGC)<V	
 F GB GS	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

TWO- STEP CORE PINS

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) • SHAFT DIAMETER TOLERANCE $^{\ 0}_{-0.005}$ TYPE—


P $^{\ 0}_{-0.005}$
Standard

When exceeding the machining limit of tip (ℓ) dimension (Refer to the following drawings Step1 • Step2)‥‥▸ "Tip (ℓ) Short two-step Core Pins" **Details are published online.**

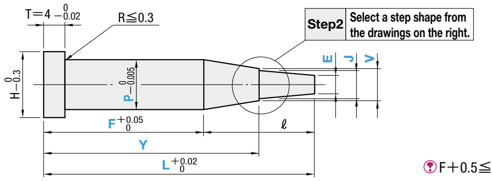


RoHS

Part Number			
Step 1	Material code	M H	Step 2
CA CB CC CD CE	KB	NAK80 37～43HRC	A B C D E
	GB	DH2F 38～42HRC	
	PB	SKD61 equivalent 48～52HRC	
	HB	SKH51 equivalent 58～60HRC	
	WB	SUS440C 56～60HRC	
	YB	MAS1C 50～54HRC	

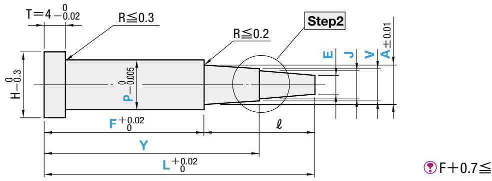
Step1 (shape for first step) select from CA～CE below

CA


T=4 $^{\ 0}_{-0.02}$
R≦0.3
Step2 Select a step shape from the drawings on the right.
H $^{\ 0}_{-0.3}$
P $^{\ 0}_{-0.005}$
E
J
V
F $^{+0.05}_{\ 0}$
ℓ
Y
L $^{+0.02}_{\ 0}$

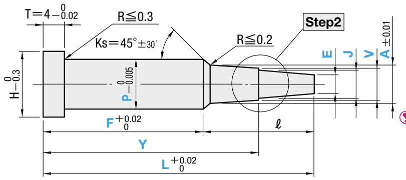
F+0.5≦Y

CB


T=4 $^{\ 0}_{-0.02}$
R≦0.3
R≦0.2
Step2
H $^{\ 0}_{-0.3}$
P $^{\ 0}_{-0.005}$
E
J
V
A ±0.01
F $^{+0.02}_{\ 0}$
ℓ
Y
L $^{+0.02}_{\ 0}$

F+0.7≦Y

CC

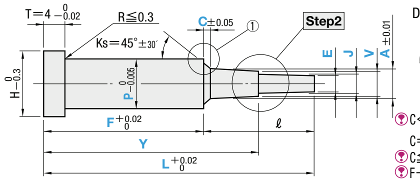

T=4 $^{\ 0}_{-0.02}$
R≦0.3
Ks=45°±30′
R≦0.2
Step2
H $^{\ 0}_{-0.3}$
P $^{\ 0}_{-0.005}$
E
J
V
A ±0.01
F $^{+0.02}_{\ 0}$
ℓ
Y
L $^{+0.02}_{\ 0}$

$F+\frac{P-A}{2}+0.5≦Y$

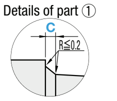
When AC code is used

$F+\frac{P-A}{2\tan AC}+0.5≦Y$

CD


T=4 $^{\ 0}_{-0.02}$
R≦0.3
C±0.05
①
Ks=45°±30′
Step2
H $^{\ 0}_{-0.3}$
P $^{\ 0}_{-0.005}$
E
J
V
A ±0.01
F $^{+0.02}_{\ 0}$
ℓ
Y
L $^{+0.02}_{\ 0}$

Details of part ①



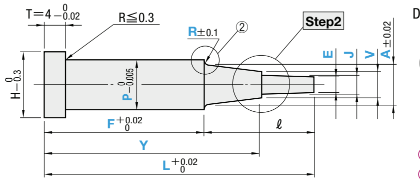
$C<\frac{P-A}{2}$

$C=\frac{P-A}{2}$ ⇨ Step1 CC

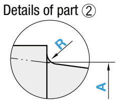
C≦1.0

F+C+0.5≦Y

CE


T=4 $^{\ 0}_{-0.02}$
R≦0.3
R±0.1
②
Step2
H $^{\ 0}_{-0.3}$
P $^{\ 0}_{-0.005}$
E
J
V
A ±0.02
F $^{+0.02}_{\ 0}$
ℓ
Y
L $^{+0.02}_{\ 0}$

Details of part ②



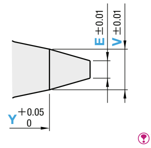
$0.2≦R≦\frac{P-A}{2}$

F+R+0.5≦Y

Step2 (shape for second step)

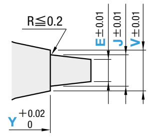
A

(Designation of V=Epossible)


E ±0.01
V ±0.01
Y $^{+0.05}_{\ 0}$

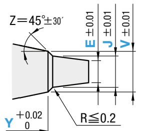
Y+0.5≦L

B


R≦0.2
E ±0.01
J ±0.01
V ±0.01
Y $^{+0.02}_{\ 0}$

Y+0.7≦L

C

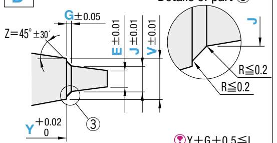

Z=45°±30′
E ±0.01
J ±0.01
V ±0.01
Y $^{+0.02}_{\ 0}$
R≦0.2

When AGC code is used

$Y+\frac{V-J}{2}+0.5≦L$　$Y+\frac{V-J}{2\tan AGC}+0.5≦L$

D

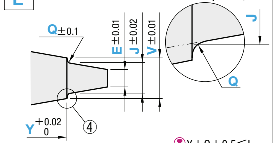
Details of part ③


G±0.05
Z=45°±30′
E ±0.01
J ±0.01
V ±0.01
J
R≦0.2
R≦0.2
③
Y $^{+0.02}_{\ 0}$

Y+G+0.5≦L

E

Details of part ④


Q±0.1
E ±0.01
J ±0.02
V ±0.01
J
Q
④
Y $^{+0.02}_{\ 0}$

Y+Q+0.5≦L

Refer to the Step2 drawing for Y tolerance

"MAS1C" will be discontinued when stocked materials are finished.

Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments										0.1mm increments				ℓmax.
	Step1	Material	Step2	No.	L		min. P max.	F	Y	A	V	J	Emin.	C	R	G	Q	
					min.	max.												
3	CA CB CC CD CE	KB GB PB HB WB YB (P≦3.99)	A B C D E	1.5	12.00	100.00	1.00～ 1.49	F≧10.00	Refer to the working limits shown in the drawing	P>A≧V When Step1 CA is selected, no designation is necessary for A.	A≧V>J When Step1 CA is selected, P>V>J When Step2 A is selected, V=E possible.	V>J≧E When Step2 A is selected, no need to designate J.	0.50	Only Step1 CD is designated 0.1≦C≦1.0 and $C<\frac{P-A}{2}$	Only Step1 CE is designated R≧0.2 and $R≦\frac{P-A}{2}$	Only Step2 D is designated 0.1≦G≦0.5 and $G<\frac{V-J}{2}$	Only Step2 E is designated Q≧0.2 and $Q≦\frac{V-J}{2}$	20.00
4				2			1.50～ 1.99						0.70					25.00
5				2.5			2.00～ 2.49											30.00
6				3			2.50～ 2.99						1.00					35.00
7				3.5			3.00～ 3.49											40.00
				4		120.00	3.50～ 3.99											45.00
8				4.5			4.00～ 4.49						1.50					60.00
				5		120.00	4.50～ 4.99											
9				5.5			5.00～ 5.49											
				6			5.50～ 5.99						2.00					
10				6.5			6.00～ 6.49											
				7			6.50～ 6.99											
11				8			7.00～ 7.99											
15				10		Only C□HB□ 150.00	8.00～ 9.99											
18				13			10.00～12.99						2.50					
21				16			13.00～15.99											
25		PB HB		20	30.00		16.00～19.99	F≧28.00					5.00					

Order

Part Number	L	P	F	Y	A	V	J	E	C・R	G・Q
CBHBB 6	62.10	P5.55	F42.00	Y53.25	A5.20	V4.70	J4.10	E3.50		
CDWBA 8	70.00	P7.25	F43.50	Y55.32	A5.00	V4.50		E4.00	C0.5	
CEPBE 6	55.75	P5.98	F43.50	Y48.76	A5.00	V4.80	J3.80	E3.00	R0.4	Q0.4

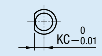
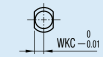
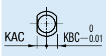
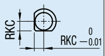
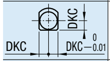
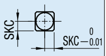
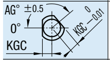
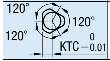
Days to Ship Quotation

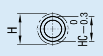
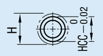
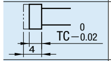
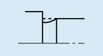
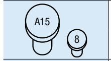
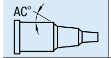
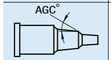
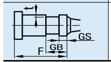
Price Quotation

Alterations

Part Number	L	P	F	Y	A	V	J	E	C・R	G・Q	(KC・WKC…etc.)
CEGBA5	56.50	P4.80	F48.00	Y52.00	A4.20	V4.10		E2.80	R0.3		RKC2.4

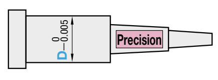
Alteration details P.441

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2		
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		

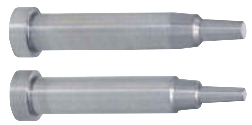
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order **P.442** Available when H≧2 Combination with SKC not available.	
	AC	Changes the standard angle(Ks=45°). AC=1° increments Available for Step1 CC/CD 30≦AC≦60 When Step1 CD : A+2(C×tanAC)<P	
	AGC	Changes the standard angle (Z=45°). AGC=1° increments Available for Step2 C/D 30≦AGC≦60 When Step2 D : J+2(G×tanAGC)<V	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order **P.442**	

PRECISION TWO-STEP CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE—


D 0 −0.005
Precision

Non JIS material definition is listed on P.1351 - 1352

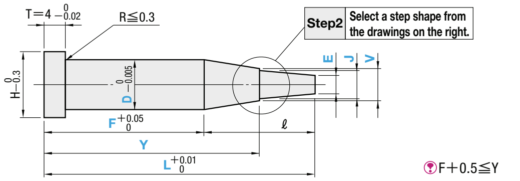


RoHS

Step 1	Material code	M/H	Step 2
CA CB CC CD CE	Z	SKD61 equivalent 48~52HRC	A B C D E
	V	SKH51 equivalent 58~60HRC	

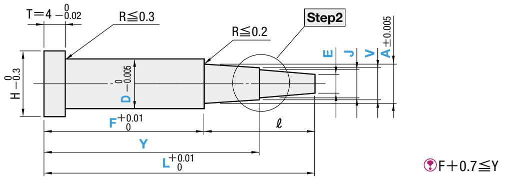
Step1 (shape for first step) select from CA~CE below

CA


T=4 0 −0.02
R≦0.3
Step2
Select a step shape from the drawings on the right.
H 0 −0.3
D 0 −0.005
E
J
V
F +0.05 0
ℓ
Y
L +0.01 0

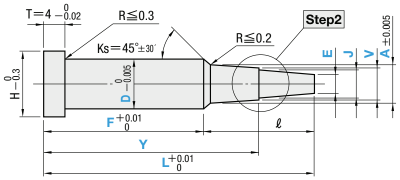
F+0.5≦Y

CB


T=4 0 −0.02
R≦0.3
R≦0.2
Step2
H 0 −0.3
D 0 −0.005
E
J
V
A ±0.005
F +0.01 0
ℓ
Y
L +0.01 0

F+0.7≦Y

CC

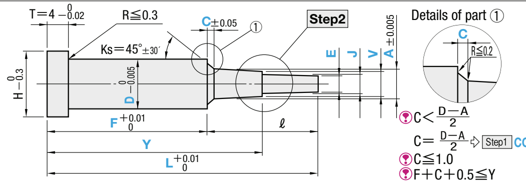

T=4 0 −0.02
R≦0.3
Ks=45°±30′
R≦0.2
Step2
H 0 −0.3
D 0 −0.005
E
J
V
A ±0.005
F +0.01 0
ℓ
Y
L +0.01 0

$F+\frac{D-A}{2}+0.5\leqq Y$

When AC code is used

$F+\frac{D-A}{2\tan AC}+0.5\leqq Y$

CD


T=4 0 −0.02
R≦0.3
C±0.05
①
Ks=45°±30′
Step2
H 0 −0.3
D 0 −0.005
E
J
V
A ±0.005
F +0.01 0
ℓ
Y
L +0.01 0
Details of part ①
C
R≦0.2

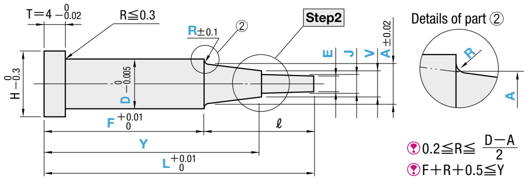
$C<\frac{D-A}{2}$

$C=\frac{D-A}{2}$ ⇨ Step1 CC

$C\leqq 1.0$

$F+C+0.5\leqq Y$

CE


T=4 0 −0.02
R≦0.3
R±0.1
②
Step2
H 0 −0.3
D 0 −0.005
E
J
V
A ±0.02
F +0.01 0
ℓ
Y
L +0.01 0
Details of part ②
R
A

$0.2\leqq R\leqq\frac{D-A}{2}$

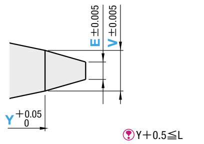
$F+R+0.5\leqq Y$

Refer to the Step2 drawing for Y tolerance

Step2 (shape for second step)

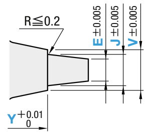
A

(Designation of V=Epossible)


E ±0.005
V ±0.005
Y +0.05 0

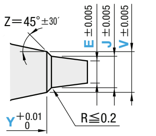
Y+0.5≦L

B


R≦0.2
E ±0.005
J ±0.005
V ±0.005
Y +0.01 0

Y+0.7≦L

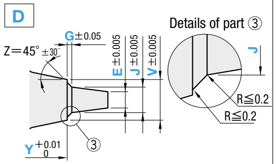
C


Z=45°±30′
E ±0.005
J ±0.005
V ±0.005
Y +0.01 0
R≦0.2

When AGC code is used

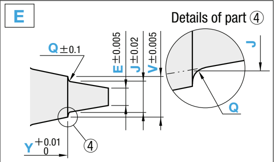
$Y+\frac{V-J}{2}+0.5\leqq L$ $Y+\frac{V-J}{2\tan AGC}+0.5\leqq L$

D


Details of part ③
G±0.05
Z=45° ±30′
E ±0.005
J ±0.005
V ±0.005
③
Y +0.01 0
J
R≦0.2
R≦0.2

Y+G+0.5≦L

E


Details of part ④
Q±0.1
E ±0.005
J ±0.02
V ±0.005
④
Y +0.01 0
J
Q

Y+Q+0.5≦L

H	Part Number				0.01mm increments								0.1mm increments				ℓmax.
	Step1	Material	Step2	D	L min.	L max.	F	Y	A	V	J	Emin.	C	R	G	Q	
3	CA CB CC CD CE	Z V	A B C D E	1	14.00	100.00	F≧12.00	Refer to the working limits shown in the drawing	D>A≧V When Step1 CA is selected, no designation is necessary for A.	A≧V>J When Step1 CA is selected, D>V>J When Step2 A is selected, V=E possible.	V>J≧E When Step2 A is selected, no need to designate J.	0.50	Only Step1 CD is designated 0.1≦C≦1.0 and $C<\frac{D-A}{2}$	Only Step1 CE is designated R≧0.2 and $R\leqq\frac{D-A}{2}$	Only Step2 D is designated 0.1≦G≦0.5 and $G<\frac{V-J}{2}$	Only Step2 E is designated Q≧0.2 and $Q\leqq\frac{V-J}{2}$	A×6 (Step1 CA =D×6) and 50.00
				1.5													
4				2								0.70					
5				2.5													
6				3								1.00					
7				3.5													
				4		120.00											A×6+5 (Step1 CA =D×6+5) and 50.00
8				4.5								1.50					
				5		120.00											
9				5.5													
				6								2.00					
10				6.5													
				7		Only C□V□ 150.00											
11				8													
15				10													
18				13								2.50					
21				16													
25				20	30.00		F≧28.00					5.00					

Order

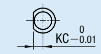
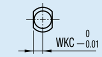
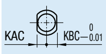
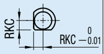
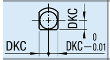
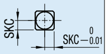
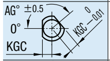
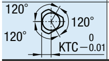
Part Number	—	L	—	F	—	Y	—	A	—	V	—	J	—	E	—	C・R	—	G・Q
CAZA 5	—	56.50	—	F48.00	—	Y52.00			—	V4.20			—	E2.80				
CCZD 5.5	—	49.95	—	F35.00	—	Y40.00	—	A4.50	—	V4.30	—	J3.50	—	E3.20			—	G0.3
CEVE 6	—	55.75	—	F43.50	—	Y48.76	—	A5.00	—	V4.80	—	J3.80	—	E3.00	—	R0.4	—	Q0.4

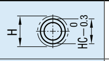
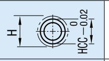
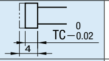
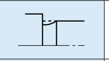
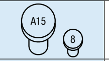
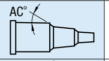
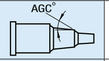
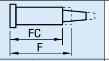
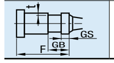
Days to Ship Quotation **Price** Quotation

Alterations

Part Number	—	L	—	F(FC)	—	Y	—	A	—	V	—	J	—	E	—	C・R	—	G・Q	—	(KC・WKC…etc.)
CEZA5	—	56.50	—	F48.00	—	Y52.00	—	A4.20	—	V4.10			—	E2.80	—	R0.3			—	RKC2.4

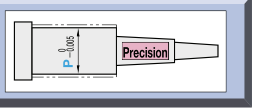
Alteration details P.441

Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	

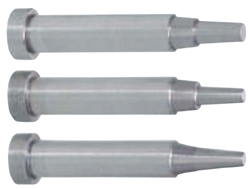
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step1 CC/CD 30≦AC≦60 When Step1 CD : A+2 (C×tanAC)<D	
	AGC	Changes the standard angle (Z=45°). AGC=1° increments Available for Step2 C/D 30≦AGC≦60 When Step2 D : J+2 (G×tanAGC)<V	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm It can be designated up to Lmin.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

PRECISION TWO-STEP CORE PINS

—SHAFT DIAMETER (P) DESIGNATION (0.005mm INCREMENTS) TYPE—


P −0.005 0
Precision

Non JIS material definition is listed on P.1351 - 1352

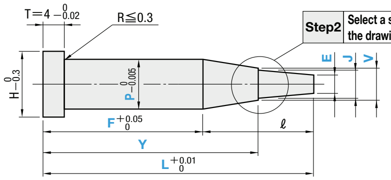


RoHS

Part Number			
Step 1	Material code	M H	Step 2
CA CB CC CD CE	ZB	SKD61 equivalent 48～52HRC	A B C D E
	VB	SKH51 equivalent 58～60HRC	

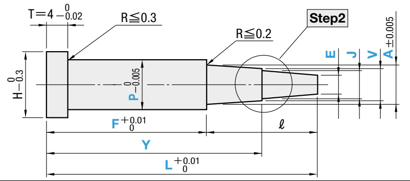
Step1 (shape for first step) select from CA～CE below

CA


T=4 −0.02 0
R≦0.3
Step2
Select a step shape from the drawings on the right.
H −0.3 0
P −0.005 0
E
J
V
F +0.05 0
ℓ
Y
L +0.01 0

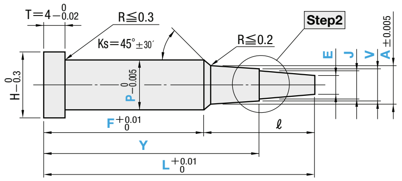
$F+0.5 \leqq Y$

CB


T=4 −0.02 0
R≦0.3
R≦0.2
Step2
A±0.005
E
J
V
H −0.3 0
P −0.005 0
F +0.01 0
ℓ
Y
L +0.01 0

$F+0.7 \leqq Y$

CC

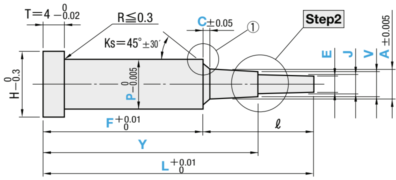

T=4 −0.02 0
R≦0.3
Ks=45° ±30′
R≦0.2
Step2
A±0.005
E
J
V
H −0.3 0
P −0.005 0
F +0.01 0
ℓ
Y
L +0.01 0

$F+\frac{P-A}{2}+0.5 \leqq Y$

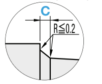
When AC code is used

$F+\frac{P-A}{2\tan AC^\circ}+0.5 \leqq Y$

CD


T=4 −0.02 0
R≦0.3
C±0.05
①
Ks=45° ±30′
Step2
A±0.005
E
J
V
H −0.3 0
P −0.005 0
F +0.01 0
ℓ
Y
L +0.01 0

Details of part ①



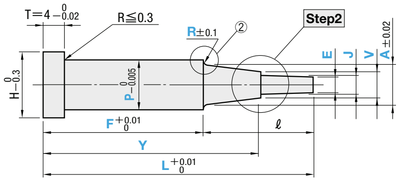
$C<\frac{P-A}{2}$

$C=\frac{P-A}{2}$ ⇨ Step1 CC

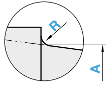
$C \leqq 1.0$

$F+C+0.5 \leqq Y$

CE


T=4 −0.02 0
R≦0.3
R±0.1
②
Step2
A±0.02
E
J
V
H −0.3 0
P −0.005 0
F +0.01 0
ℓ
Y
L +0.01 0

Details of part ②



$0.2 \leqq R \leqq \frac{P-A}{2}$

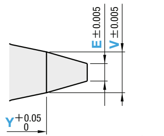
$F+R+0.5 \leqq Y$

Refer to the Step2 drawing for Y tolerance

Step2 (shape for second step)

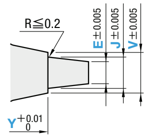
A

(Designation of V=E possible)


E±0.005
V±0.005
Y +0.05 0

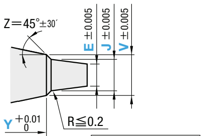
$Y+0.5 \leqq L$

B


R≦0.2
E±0.005
J±0.005
V±0.005
Y +0.01 0

$Y+0.7 \leqq L$

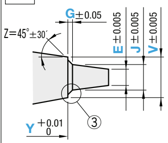
C


Z=45° ±30′
E±0.005
J±0.005
V±0.005
Y +0.01 0
R≦0.2

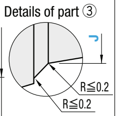
When AGC code is used

$Y+\frac{V-J}{2}+0.5 \leqq L$ $Y+\frac{V-J}{2\tan AGC^\circ}+0.5 \leqq L$

D

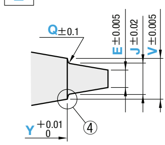

G±0.05
Z=45° ±30′
E±0.005
J±0.005
V±0.005
Y +0.01 0
③

Details of part ③

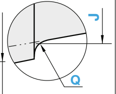


$Y+G+0.5 \leqq L$

E


Q±0.1
E±0.005
J±0.02
V±0.005
Y +0.01 0
④

Details of part ④



$Y+Q+0.5 \leqq L$

H	Part Number				0.01mm increments		0.005mm increments	0.01mm increments						0.1mm increments				ℓmax.
	Step1	Material	Step2	No.	L min.	L max.	min. P max.	F	Y	A	V	J	Emin.	C	R	G	Q	
3	CA CB CC CD CE	ZB VB	A B C D E	1.5	14.00	100.00	1.000～ 1.495	F≧12.00	Refer to the working limits shown in the drawing	P＞A≧V When Step1 CA is selected, no designation is necessary for A.	A≧V＞J When Step1 CA is selected, P＞V＞J Designation of V=E possible when Step2 A is selected.	V＞J≧E No need to designate J when Step2 A is selected.	0.50	Only Step1 CD is designated 0.1≦C≦1.0 and $C<\frac{P-A}{2}$	Only Step1 CE is designated R≧0.2 and $R \leqq \frac{P-A}{2}$	Only Step2 D is designated 0.1≦G≦0.5 and $G \leqq \frac{V-J}{2}$	Only Step2 E is designated Q≧0.2 and $Q \leqq \frac{V-J}{2}$	A×6 (Step1 CA =P×6) and 50.00
4				2			1.500～ 1.995						0.70					
5				2.5			2.000～ 2.495											
6				3			2.500～ 2.995						1.00					
7				3.5			3.000～ 3.495											
				4		120.00	3.500～ 3.995											
8				4.5			4.000～ 4.495						1.50					
				5		120.00	4.500～ 4.995											A×6+5 (Step1 CA =P×6+5) and 50.00
9				5.5			5.000～ 5.495											
				6			5.500～ 5.995						2.00					
10				6.5			6.000～ 6.495											
				7			6.500～ 6.995											
11				8		Only C□VB□ 150.00	7.000～ 7.995											
15				10			8.000～ 9.995											
18				13			10.000～12.995						2.50					
21				16			13.000～15.995											
25				20	30.00		16.000～19.995	F≧28.00					5.00					

Order

Part Number	L	P	F	Y	A	V	J	E	C・R	G・Q
CBVBB6	62.10	P5.555	F42.00	Y53.25	A5.20	V4.70	J4.10	E3.50		
CDVBA8	70.00	P7.255	F43.50	Y55.32	A5.00	V4.50		E4.00	C0.5	
CEVBE6	55.75	P5.980	F43.50	Y48.76	A5.00	V4.80	J3.80	E3.00	R0.4	Q0.4

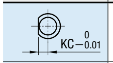
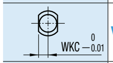
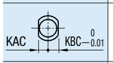
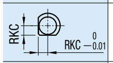
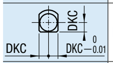
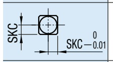
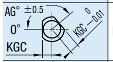
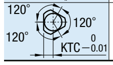
Days to Ship Quotation

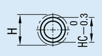
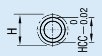
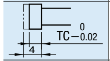
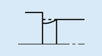
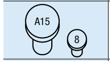
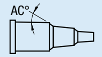
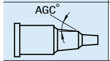
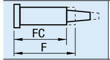
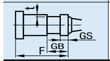
Price Quotation

Alterations

Part Number	L	P	F(FC)	Y	A	V	J	E	C・R	G・Q	(KC・WKC···etc.)
CEVBA5	56.50	P4.800	F48.00	Y52.00	A4.20	V4.10		E2.80	R0.3		RKC2.4

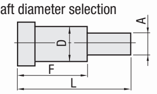
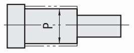
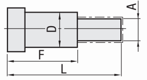
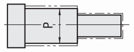
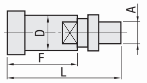
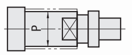
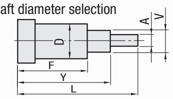
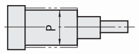
Alteration details P.441

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC＜H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC＜H/2	
 KAC KBC −0.01 0	KAC KBC	Varied width parallel flats cutting P/2≦KAC＜H/2 KBC=0.1mm increments only KAC＜KBC＜H/2	
 RKC RKC −0.01 0	RKC	Two flats (right angled) cutting P/2≦RKC＜H/2	
 DKC DKC DKC −0.01 0	DKC	Three flats cutting P/2≦DKC＜H/2	
 SKC SKC −0.01 0	SKC	Four flats cutting P/2≦SKC＜H/2	
 AG° ±0.5 0° KGC KGC −0.01 0	KGC	Two flats (angled) cutting P/2≦KGC＜H/2 0＜AG＜360 AG=1° increments	
 120° 120° 120° KTC −0.01 0	KTC	Three flats cutting at 120° P/2≦KTC＜H/2	

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P≦HC＜H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC＜H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC＜4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	Quotation
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.442 Available when H≧2 ⊗ Combination with SKC not available.	
	AC	Changes the standard angle(Ks=45°). AC=1° increments Available for Step1 CC/CD 30≦AC≦60 When Step1 CD : A+2(C×tanAC)＜P	
	AGC	Changes the standard angle (Z=45°). AGC=1° increments Available for Step2 C/D 30≦AGC≦60 When Step2 D : J+2(G×tanAGC)＜V	
	FC	F dimension becomes shorter than Fmin. Makes L dimension shorter than L min. too. FC≧5mm It can be designated up to Lmin.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB How to order P.442	

TAPERLESS CORE PINS

TAPERLESS CORE PINS

Type		T			M				Page
	Group	Shaft diameter (D or P)	Tip part (V, A)	Length (L, Y, F)	SKH51 equivalent	SKD61 equivalent	NAK80	SUS440C	
TAPERLESS ONE-STEP CORE PINS Shaft diameter selection 	Standard	$^{0}_{-0.005}$	$^{0}_{-0.01}$	$^{+0.02}_{0}$	CPHS−□□	CPPS−□□	CPKS−□□	CPWS−□□	P.497
	Precision	$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{+0.01}_{0}$	CPVS−□□	CPZS−□□	—	—	P.501
	Extra precision	$^{0}_{-0.003}$	$^{0}_{-0.003}$	$^{+0.01}_{0}$	CPMS−□□	—	—	—	P.505
TAPERLESS ONE-STEP CORE PINS Shaft diameter designation 	Standard	$^{0}_{-0.005}$	$^{0}_{-0.01}$	$^{+0.02}_{0}$	CPHBS−□□	CPPBS−□□	CPKBS−□□	CPWBS−□□	P.499
	Precision	$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{+0.01}_{0}$	CPVBS−□□	CPZBS−□□	—	—	P.503
	Extra precision	$^{0}_{-0.003}$	$^{0}_{-0.003}$	$^{+0.01}_{0}$	CPMBS−□□	—	—	—	P.507
TAPERLESS ONE-STEP CORE PINS −Lapped Type− Shaft diameter selection 	Standard	$^{0}_{-0.005}$	±0.01	$^{+0.02}_{0}$	L−CPHS−□□	L−CPPS−□□	—	—	P.509
TAPERLESS ONE-STEP CORE PINS −Lapped Type− Shaft diameter designation 		$^{0}_{-0.005}$	±0.01	$^{+0.02}_{0}$	L−CPHBS−□□	L−CPPBS−□□	—	—	P.509
GAS RELEASE TAPERLESS ONE-STEP CORE PINS Shaft diameter selection 	Standard	$^{0}_{-0.005}$	$^{0}_{-0.01}$	$^{+0.02}_{0}$	GV−CPHS−□□	GV−CPPS−□□	—	—	P.511
	Precision	$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{+0.01}_{0}$	GV−CPVS−□□	GV−CPZS−□□	—	—	P.511
GAS RELEASE TAPERLESS ONE-STEP CORE PINS Shaft diameter designation 	Standard	$^{0}_{-0.005}$	$^{0}_{-0.01}$	$^{+0.02}_{0}$	GV−CPHBS−□□	GV−CPPBS−□□	—	—	P.513
	Precision	$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{+0.01}_{0}$	GV−CPVBS−□□	GV−CPZBS−□□	—	—	P.513
TAPERLESS TWO-STEP CORE PINS Shaft diameter selection 	Precision	$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{+0.01}_{0}$	C□SV□□	C□SZ□□	—	—	P.515
TAPERLESS TWO-STEP CORE PINS Shaft diameter designation 		$^{0}_{-0.005}$	$^{0}_{-0.005}$	$^{+0.01}_{0}$	C□SVB□□	C□SZB□□	—	—	P.517

(?) Length (L/Y/F) tolerance varies depending on the selected shape.

■Material Characteristics of Taperless Core Pins

(?) Use these data for reference only as they are dependent on specific heat treatment and usage conditions.

M			SKH51 (M2) (1.3343) High speed tool steel	SKD61 (H13) (1.2344) Thermal die steel	NAK80 (P21 group) (Ni-Cr-Mo-steel) Precipitation hardened steel group Prehardened steel	SUS440C (S44004) (1.4125) Martensite type Stainless steel
H HRC			58～60	48～52	37～43	56～60
Machining characteristics	Wear resistance		5	3.5	2	4
	Ability to be mirror-finished		4	4	5	4
	Toughness		3	5	1	3
	Corrosion resistance		3	3	3	5
Physical characteristics	Density	[g/cm³]	8.2	7.75	7.8	7.78
	Modulus of longitudinal elasticity	[kg/mm²]	22300	21000	20500	20400
	Coefficient of thermal expansion	[×10⁻⁶/℃]	10.1	10.8	12.5	10.2
	Thermal conductivity	[cal/cm・sec・℃]	0.0509	0.061	0.1	0.058
Mechanical characteristics	Tensile strength	[kgf/mm²]	235	135	128	205
	Charpy impact value	[kgf・m/cm²]	2	6	2.2	1.5

Machining characteristics Inferior 1←→5 Excellent

Conversion formula 1kgf/mm²=9.81N/mm² 1cal/cm・sec・℃=418.6W/M.K 1kgf・m/cm²=9.81J/cm²

■Selection Method for Taperless One-step Core Pins

Codes for Taperless One-step Core Pin Specifications

Shaft diameter (D) selection type	CP□ S − □□
Shaft diameter (P) designation type	CP□BS − □□

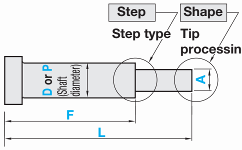
Material・tolerance codes

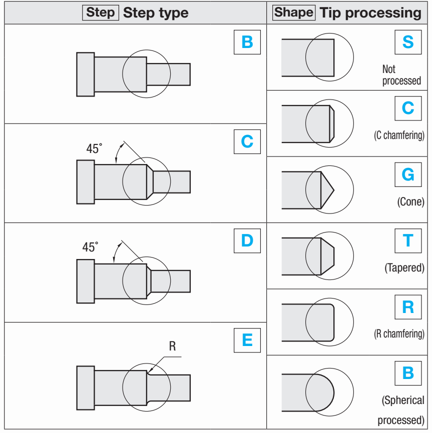
Shape code

Tip process code

Group		Extra precision	Precision	Standard
T	Shaft diameter (D or P)	$^{0}_{-0.003}$	$^{0}_{-0.005}$	
	Tip part (A)	$^{0}_{-0.003}$	$^{0}_{-0.005}$	$^{0}_{-0.01}$
	Length (L, F)	$^{+0.01}_{0}$ (* Reference tolerance)	$^{+0.01}_{0}$ (* Reference tolerance)	$^{+0.02}_{0}$ (* Reference tolerance)
M	SKH51 equivalent	M	V	H
	SKD61 equivalent	—	Z	P
	NAK80	—	—	K
	SUS440C	—	—	W

*The tolerance values for dimensions L and F are representative ones. The tolerance range varies depending on the shape selected. For details, refer to the Catalog page for each product.


Step
Step type
Shape
Tip processing
D or P (Shaft diameter)
A
F
L


Step Step type
Shape Tip processing
B
C
45˚
D
45˚
E
R
S
Not processed
C
(C chamfering)
G
(Cone)
T
(Tapered)
R
(R chamfering)
B
(Spherical processed)

■Selection Method for Taperless Two-step Core Pins

Codes for Taperless Two-step Core Pin Specifications

Shaft diameter (D) selection type	C□S□ □□
Shaft diameter (P) designation type	C□S□B □□

Material code

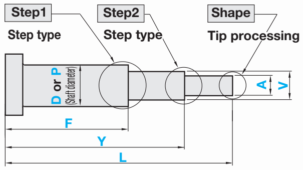
Code for the first step

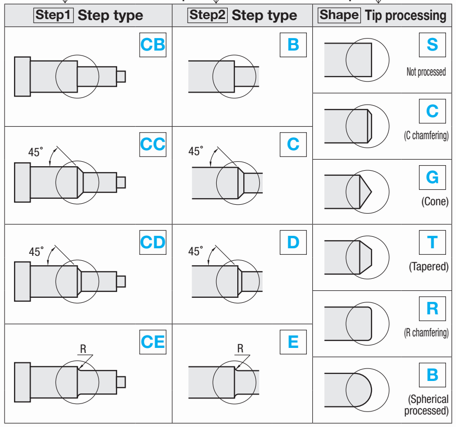
Code for the second step

Tip process code

Group		Precision
T	Shaft diameter (D or P)	$^{0}_{-0.005}$
	Tip part (A)	$^{0}_{-0.005}$
	Length (L, Y, F)	$^{+0.01}_{0}$ (* Reference tolerance)
M	SKH51 equivalent	V
	SKD61 equivalent	Z

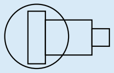
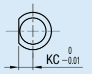
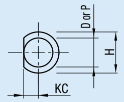
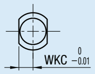
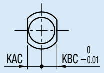
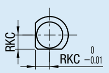
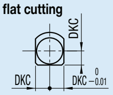
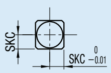
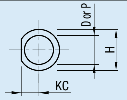
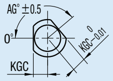
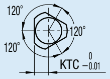
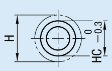
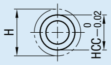
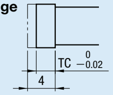
*The tolerance values for dimensions L,Y and F are representative ones. The tolerance range varies depending on the shape selected. For details, refer to the Catalog page for each product.


Step1
Step type
Step2
Step type
Shape
Tip processing
D or P (Shaft diameter)
A
V
F
Y
L


Step1 Step type
Step2 Step type
Shape Tip processing
CB
B
CC
45˚
C
45˚
CD
45˚
D
45˚
CE
R
E
R
S
Not processed
C
(C chamfering)
G
(Cone)
T
(Tapered)
R
(R chamfering)
B
(Spherical processed)

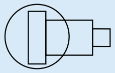
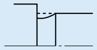
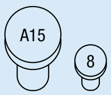
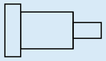
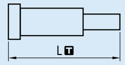
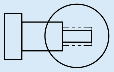
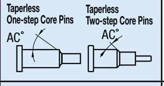
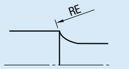
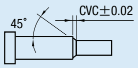
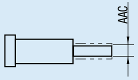
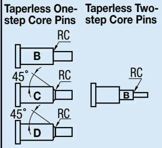
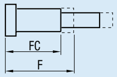
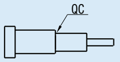
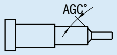
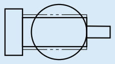
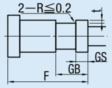
ALTERATION GUIDE FOR TAPERLESS CORE PINS

■Alteration Guide for Taperless Core Pins

Items	Applicable Products	Alterations	Codes	Specifications	1 Code
 **Head alteration**	**Common**	**Key flat cutting**  	**KC**	Single flat cutting Range of designation (D or P)/2≦KC<H/2 When the key flat size is (shaft diameter/2)  Unit of designation Shaft diameter selection type (D/2) ·········0.05mm increments possible Shaft diameter designation (0.01mm increments) type (P/2) ······0.005mm increments possible Shaft diameter designation (0.005mm increments) type (P/2) ···0.0025mm increments possible Shaft diameter designation (0.001mm increments) type (P/2) ···0.0005mm increments possible Designation method · KC2.61 (When P5.22) · WKC3.0875 (When P6.175) · RKC2.7425 (When P5.485) · DKC3 (When D6) · SKC2.5 (When D5) · KGC1.5−AG125 (When D3) · KTC3.085 (When P6.17)	**Quotation**
		Key flat cutting  	**WKC**	Two parallel flats cutting Range of designation (D or P)/2≦WKC<H/2	
		Key flat cutting  	**KAC** **KBC**	Varied width parallel flats cutting Range of designation (D or P)/2≦KAC KAC<KBC<H/2	
		Key flat cutting  	**RKC**	Right angled two falts cutting Range of designation (D or P)/2≦RKC<H/2	
		Key flat cutting  	**DKC**	Three flats cutting Range of designation (D or P)/2≦DKC<H/2	
		Key flat cutting  	**SKC**	Four flats cutting Range of designation (D or P)/2≦SKC<H/2 To designate an arbitrary flat size  Unit of designation 0.1mm increments Designation method · KC1.4 · WKC2.3 · KAC1.4−KBC1.6 · RKC1.4 · DKC1.75 · SKC5.8 · KGC1.4−AG85 · KTC2.3	
		Key flat cutting (angled)  	**KGC**	Adds a flat at the reference plane (0°), and another at the designated angle from there. Range of designation (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments	
		Key flat cutting (angled)  	**KTC**	Three flats cutting at 120° Range of designation (D or P)/2≦KTC<H/2	
		Head diameter change  	**HC**	Reduces the head diameter. Range of designation (D or P)≦HC<H Unit of designation 0.1mm increments Designation method HC6.5 In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
		Head diameter change (precision)  	**HCC**	Reduces the head diameter. (precision) Range of designation (D or P)+0.5≦HCC<H−0.3 Unit of designation 0.1mm increments Designation method HCC6.1	
		Head thickness change  	**TC**	Reduces the head thickness. Range of designation 1.5≦TC<4 Unit of designation 0.1mm increments Designation method TC3.5 Dimensions L, Y and F remain unchanged.	

Note that designating (H/2−0.15) or more for key flat cutting alteration will create hardly any flat on the head.

■Alteration Guide for Taperless Core Pins

Items	Applicable Products	Alterations	Codes	Specifications	1 Code
 **Head alteration**	**Common**	**Relief under the head** 	**TRN**	Adds a relief under the head, making plate chamfering unnecessary. Designation method TRN	**Quotation**
		Numbering on the head  	**NHC**	Numbering on the head Electrolytic marking of ID code on the head(in 5 point, Round Gothic type). Available characters Numerals: 0〜9; Alphabets: A〜Z Range of designation 1 character when 2≦H≦4.9 1 or 2 characters when 5≦H≦6.9 (Only the first character may be an alphabet.) Up to 3 characters when 7≦H (Only the first character may be an alphabet.) Note that depending upon the specified characters,if the space indicated in the table below does not exist on the head, it may not be possible to carry out numbering machining. Unit:mm Combination with SKC not available. Designation method NHC−6, NHC−23, NHC−A90 Available when head diameter H≧2	
 **L dimension alternation**	**Extra precision** **Taperless One-step Core Pins**	 	**LKC**	L dimension tolerance $^{+0.01}_{0}$ can be changed to $^{+0.005}_{0}$. Unit of designation L dimension 0.005mm increments Available when 1.5≦(D or P)≦5 Designation method LKC Available for Shape S・C・T・R Combination with FC not available.	
 **Type alteration**	**Common**	 Taperless One-step Core Pins AC° Taperless Two-step Core Pins AC°	**AC**	Changes the Ks angle (default: 45°). Range of designation 30≦AC≦60 Unit of designation 1° increments Designation method AC40 Taperless One-step Core Pins Available for Step C・D Taperless Two-step Core Pins Available for Step1 CC・CD When Step D, Step1 CD, A+2(C×tanAC)<D or P Available when C≦1.0 Combination with CVC/RC not available.	
	Standard **Taperless One-step Core Pins**	 	**RE**	R shape alteration (enlargement) Range of designation 0.5≦RE≦2.0 Unit of designation 0.5mm increments Designation method RE1.0 F tolerance is $^{+0.05}_{0}$ Available for Step E	
	Taperless One-step Core Pins	 	**CVC**	C dimension can be designated at 0.01mm increments. Range of designation 0.10≦CVC≦1.00 Unit of designation 0.01mm increments Designation method CVC0.25 Available for Step D	
		A dimension alteration  	**AAC**	Extends A min. up to AAC min. Unit of designation Standard: 0.01mm increments Precision : 0.01mm increments Extra Precision : 0.001mm increments Designation method AAC 0.40 ℓ≦10×AAC In case of D(No.)=2 3・4.5・5, A min. is the machining limit, and AAC cannot be used. NAK material is available when D(No.)≧3.5. For tip-lapped products, refer to the standard page.	
	Precision **Extra precision** **Taperless One-/Two-step Core Pins**	 Taperless One-step Core Pins Taperless Two-step Core Pins RC B 45° RC C 45° RC D RC B	**RC**	Changes R (normally ≦0.1) to R≦0.05. Designation method RC Taperless One-step Core Pins Available for Step B/C/D Taperless Two-step Core Pins Available for Step2 B	
		 	**FC**	F dimension becomes shorter than Fmin.,and L dimension can be shorter than L min., too. Range of designation 5.00≦FC≦F min. Unit of designation 0.01mm increments Designation method FC6.00 It can be designated up to L min.=6.5mm when FC code is used.	
	Precision **Taperless Two-step Core Pins**	 	**QC**	Changes R (normally ≦0.1) to R≦0.05. Designation method QC Available for Step1 CB	
		 	**AGC**	Changes the standard angle (Z=45°). Range of designation 30≦AGC≦60 Unit of designation 1° increments Available for Step2 C・D Designation method AGC35 Working limits of Step2 D. : A+2(C×tanAGC°)<V	
 **Shaft alteration**	**Common**	**Vent machining**  	**GVC**	Gas vent machining Range of designation 2≦GS≦10, GS+2≦GB≦30 Unit of designation 1mm increments Designation method GVC−GS3−GB20 Available when F min. ≦F−GB, D or P≧2.00	

Unit:mm

	Character Heigt	Character Width
1 Character	2.3	2.7
2 Character	2.3	5.0
3 Character	2.3	7.3

D(No.)	Amin.	AACmin.
1〜1.5	0.50	0.40
3.5〜4	1.00	0.70
5.5	1.50	1.00
6〜16	2.00	1.50
20	5.00	4.00

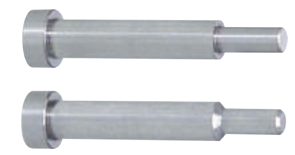
D or P	t
2.00〜 4.99	0.1
5.00〜 9.99	0.2
10.00〜20.00	0.3

TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER(D)SELECTION TYPE—

Standard

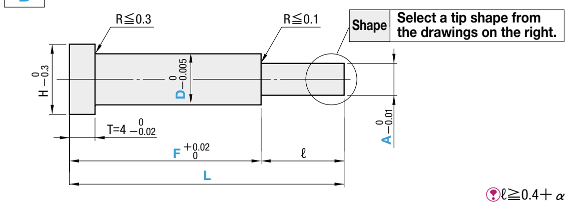
RoHS



M H	Part Number		
	Type	Step	Shape
SKD61 equivalent 48~52HRC	CPPS—	B C D E	S C G T R B
SKH51 equivalent 58~60HRC	CPHS—		
NAK80 37~43HRC	CPKS—		
SUS440C 56~60HRC	CPWS—		

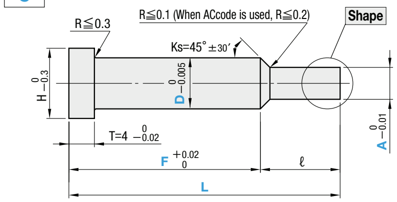
Step (Step type) Select from B~E in the drawing below.

B


R≦0.3
R≦0.1
Shape
Select a tip shape from the drawings on the right.
H −0.3 0
D −0.005 0
A −0.01 0
T=4 −0.02 0
F +0.02 0
ℓ
L

ℓ≧0.4+α

C

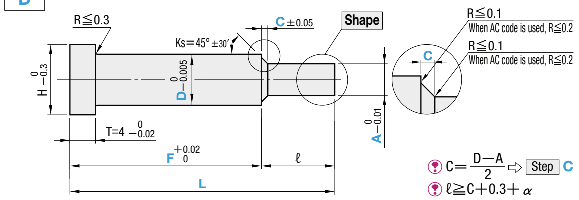

R≦0.3
R≦0.1 (When ACcode is used, R≦0.2)
Shape
Ks=45°±30′
H −0.3 0
D −0.005 0
A −0.01 0
T=4 −0.02 0
F +0.02 0
ℓ
L

$\ell \geqq \frac{D-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC^\circ}+0.3+\alpha$

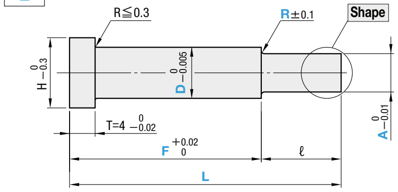
D


R≦0.3
C±0.05
Shape
Ks=45°±30′
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
C
H −0.3 0
D −0.005 0
A −0.01 0
T=4 −0.02 0
F +0.02 0
ℓ
L

$C=\frac{D-A}{2}$ ⇨ Step C

ℓ≧C+0.3+α

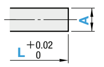
E


R≦0.3
R±0.1
Shape
H −0.3 0
D −0.005 0
A −0.01 0
T=4 −0.02 0
F +0.02 0
ℓ
L

ℓ ≧R+0.3+α

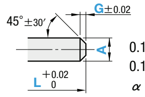
Shape (Tip shape)

S (Not processed)



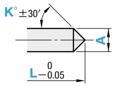
α=0

C (C chamfering)


45°±30′
G±0.02
A
L +0.02 0

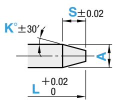
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)



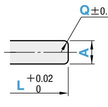
20<K≦60
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)


K°±30′
S±0.02
A
L +0.02 0

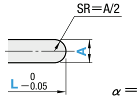
$0.1 \leqq S < \frac{A}{2\tan K}$
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfering)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)


SR=A/2
A
L −0.05 0

α=A/2

Refer to the Shape drawing for L tolerance

Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments						0.1mm increments		ℓ max.
					L		F		A		C	R	
	Type	Step	Shape	D	min.	max.	min.	max.	min.	max.			
3	CPPS— CPHS— CPKS— (D≦16) CPWS— (D≦16)	B C D E	S C G T R B	1	12.00	100.00	10.00	L−ℓ min. ℓ min. Refer to Step drawing	0.50	D>A	Only Step D is designated. $C<\frac{D-A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R \leqq \frac{D-A}{2}$ and R≧0.2	ℓ≦10×A and ℓ≦35
				1.5									
4				2									
5				2.5									
6				3					0.70				
7				3.5		120.00			1.00				
				4									
8				4.5									
				5		120.00 CPHS only 150.00							
9				5.5					1.50				
				6					2.00				
10				6.5									
				7									
11				8									
15				10									
18				13									
21				16									
25				20	30.00		28.00		5.00				

Order

Part Number	L	F	A	C・R	Tip size (K・S・G・Q)
CPPS—BS4	45.55	F40.00	A3.50		
CPHS—CC6	52.30	F42.50	A4.60		G1.0
CPWS—DG5	48.62	F37.55	A4.00	C0.2	K30
CPKS—ER6.5	55.65	F42.35	A4.50	R0.5	Q0.5

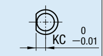
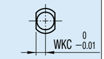
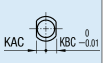
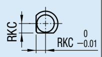
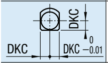
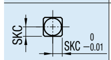
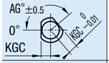
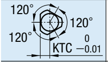
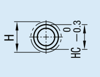
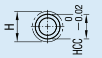
Days to Ship Quotation

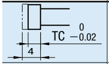
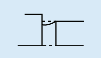
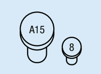
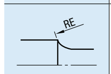
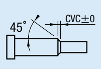
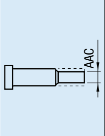
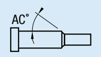
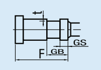
Price Quotation

Alterations

Part Number	L	F	A(AAC)	C(CVC)・R(RE)	K・S・G・Q	(KC・WKC…etc.)
CPPS—DC6	65.00	F55.00	A3.50	C0.5	G0.5	KC3.0—TC3.0
CPHS—DS5	50.00	F38.00	A2.00	C0.3		TRN

Alteration details ☞ P.495

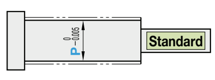
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2		Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	About Designation Unit for Key Flat Cutting	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	(1)To align the key flat with the shaft diameter	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	Unit of designation 0.05mm increments possible	
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2	(2)To designate arbitrary key flat dimensions	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	Unit of designation 0.1mm	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3		

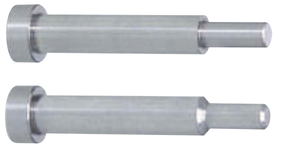
Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	Quotation
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order ☞ P.496 Available when H≧2 ⊗ Combination with SKC not available.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step E	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AAC	Extends the working limit of A min. AAC=0.01mm increments ℓ≦10×AAC CPKS is available when D≧3.5 D / A min. / AAC min. 1~1.5 / 0.50 / 0.40 3.5~4 / 1.00 / 0.70 5.5 / 1.50 / 1.00 6~16 / 2.00 / 1.50 20 / 5.00 / 4.00 ⊗ In case of D No.=2~3・4.5・5, A min. is the machining limit, and AAC cannot be used.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 When Step D, C≦1.0, A+2 (C×tanAC°)<D	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order ☞ P.496	

For details of a Gas Release Core Pin with Gas Vent, which is a product similar to altera tion GVC ☞ P.511

TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—

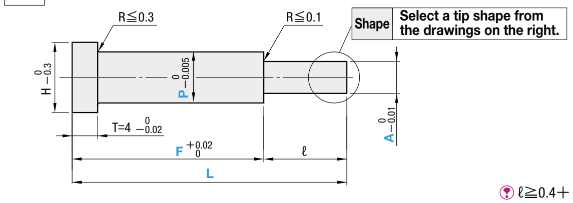

P−0.005 0
Standard



M H	Type	Step	Shape
SKD61 equivalent 48~52HRC	CPPBS—	B C D E	S C G T R B
SKH51 equivalent 58~60HRC	CPHBS—		
NAK80 37~43HRC	CPKBS—		
SUS440C 56~60HRC	CPWBS—		

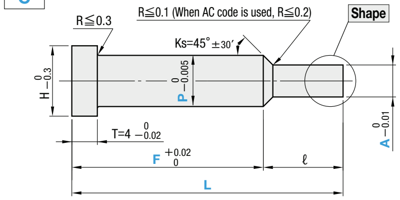
Step (Step type) Select from B~E in the drawing below.

B


R≦0.3
R≦0.1
Shape Select a tip shape from the drawings on the right.
H −0.3 0
P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A −0.01 0

ℓ≧0.4+α

C

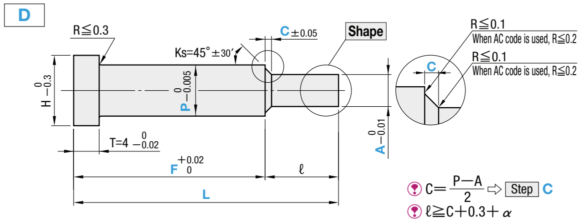

R≦0.3
R≦0.1 (When AC code is used, R≦0.2)
Shape
Ks=45°±30′
H −0.3 0
P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A −0.01 0

$\ell \geqq \frac{P-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC^{\circ}}+0.3+\alpha$

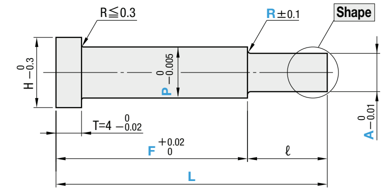
D


R≦0.3
C±0.05
Shape
Ks=45°±30′
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
C
H −0.3 0
P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A −0.01 0

$C=\frac{P-A}{2}$ ⇨ Step C

ℓ≧C+0.3+α

E


R≦0.3
R±0.1
Shape
H −0.3 0
P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A −0.01 0

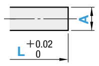
P≧0.90

ℓ≧R+0.3+α

Refer to the Shape drawing for L tolerance

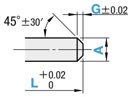
Shape (Tip shape)

S (Not processed)



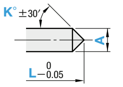
α=0

C (C chamfering)


45°±30′
G±0.02
A
L +0.02 0

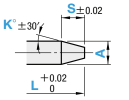
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)



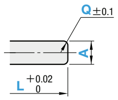
20<K≦60
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)


K°±30′
S±0.02
A
L +0.02 0

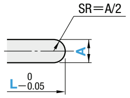
$0.1 \leqq S < \frac{A}{2\tan K}$
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfering)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)


SR=A/2
A
L −0.05 0

α=A/2

Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments							0.1mm increments		ℓ max.
	Type	Step	Shape	No.	L min.	L max.	min.Pmax.	F min.	F max.	A min.	A max.	C	R	
3	CPPBS— CPHBS— CPKBS— (P≦15.99) CPWBS— (P≦15.99)	B C D E	S C G T R B	1	12.00	100.00	0.80~ 0.99	10.00	L−ℓ min. ℓ min. Refer to Step drawing	0.50	P>A	Only Step D is designated. $C<\frac{P-A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R \leqq \frac{P-A}{2}$ and R≧0.2	ℓ≦10×A and ℓ≦35
				1.5			1.00~ 1.49							
4				2			1.50~ 1.99							
5				2.5			2.00~ 2.49							
6				3			2.50~ 2.99			0.70				
7				3.5		120.00	3.00~ 3.49			1.00				
				4			3.50~ 3.99							
8				4.5			4.00~ 4.49							
				5		120.00	4.50~ 4.99							
9				5.5			5.00~ 5.49			1.50				
				6			5.50~ 5.99			2.00				
10				6.5			6.00~ 6.49							
				7		CPHBS only 150.00	6.50~ 6.99							
11				8			7.00~ 7.99							
15				10			8.00~ 9.99							
18				13			10.00~12.99							
21				16			13.00~15.99							
25				20	30.00		16.00~19.99	28.00		5.00				

Step E is No.1 (P≧0.90)~

Order

Part Number		L		P		F		A		C・R		Tip size (K・S・G・Q)
CPPBS−BS4	—	45.55	—	P3.98	—	F40.00	—	A3.50				
CPHBS− CC6	—	52.30	—	P5.56	—	F42.50	—	A4.60			—	G1.0
CPWBS−DG5	—	48.62	—	P4.77	—	F37.55	—	A4.00	—	C0.2	—	K30
CPKBS−ER6.5	—	55.65	—	P6.23	—	F42.35	—	A4.50	—	R0.5	—	Q0.5

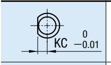
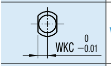
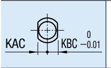
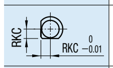
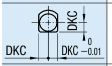
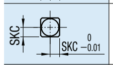
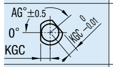
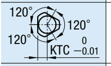
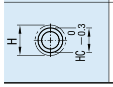
Days to Ship Quotation

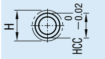
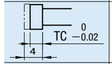
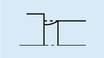
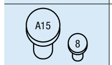
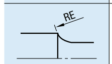
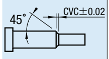
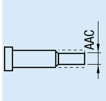
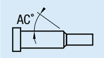
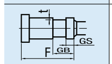
Price Quotation

Alterations

Part Number		L		P		F		A(AAC)		C(CVC)・R(RE)		K・S・G・Q		(KC・WKC…etc.)
CPPBS−DC6	—	65.00	—	P5.75	—	F55.00	—	A3.50	—	C0.5	—	G0.5	—	KC3.0−TC3.0
CPHBS−DS5	—	50.00	—	P4.89	—	F38.00	—	A2.00	—	C0.3			—	TRN

Alteration details P.495

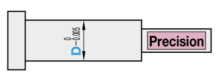
Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	(1)To align the key flat with the shaft diameter	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	Unit of designation 0.005mm increments possible	
	DKC	Three flats cutting P/2≦DKC<H/2		
	SKC	Four flats cutting P/2≦SKC<H/2	(2)To designate arbitrary key flat dimensions	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	Unit of designation 0.1mm	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		

Alterations	Code	Spec.	1Code
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	Quotation
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 Available when H≧2 Combination with SKC not available.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Available for Step E	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AAC	Extends the working limit of A min. AAC=0.01mm increments ℓ≦10×AAC CPKBS is available when P≧3.00 No. / A min. / AAC min.: 1~1.5 / 0.50 / 0.40; 3.5~4 / 1.00 / 0.70; 5.5 / 1.50 / 1.00; 6~16 / 2.00 / 1.50; 20 / 5.00 / 4.00 In case of No.=2~3・4.5・5, A min. is the machining limit, and AAC cannot be used.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 When Step D, C≦1.0, A+2(C×tanAC°)<P	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.00 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order P.496	

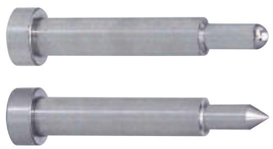
For details of a Gas Release Core Pin, which is a product similar to alteration GVC, P.513

PRECISION TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (D) SELECTION TYPE—


D −0.005 0
Precision

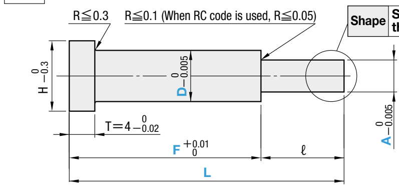
Non JIS material definition is listed on P.1351 - 1352



M / H	Part Number Type	Step	Shape
SKD61 equivalent 48～52HRC	CPZS—	B C D E	S C G T R B
SKH51 equivalent 58～60HRC	CPVS—		

Step (Step type) Select from B～E in the drawing below.

B

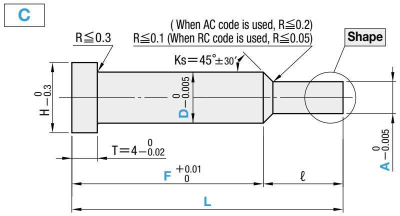

R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
Shape Select a tip shape from the drawings on the right.
H 0 −0.3
D 0 −0.005
A 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L

$\ell \geqq 0.4+\alpha$

When RC code is used

$\ell \geqq 0.35+\alpha$

C

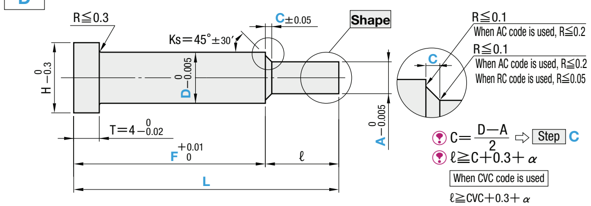

R≦0.3
(When AC code is used, R≦0.2)
R≦0.1 (When RC code is used, R≦0.05)
Shape
Ks=45°±30′
H 0 −0.3
D 0 −0.005
A 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L

$\ell \geqq \frac{D-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{D-A}{2\tan AC^{\circ}}+0.3+\alpha$

D


R≦0.3
C±0.05
Shape
Ks=45°±30′
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
When RC code is used, R≦0.05
C
H 0 −0.3
D 0 −0.005
A 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L

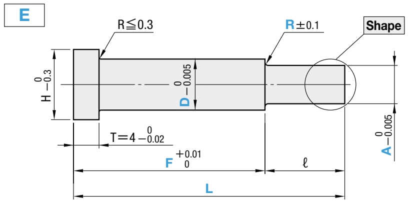
$C=\frac{D-A}{2}$ ⇨ Step C

$\ell \geqq C+0.3+\alpha$

When CVC code is used

$\ell \geqq CVC+0.3+\alpha$

E

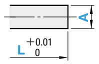

R≦0.3
R±0.1
Shape
H 0 −0.3
D 0 −0.005
A 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L

$\ell \geqq R+0.3+\alpha$

Refer to the Shape drawing for L tolerance

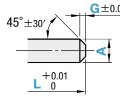
Shape (Tip shape)

S (Not processed)



$\alpha=0$

C (C chamfering)

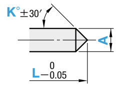

45°±30′
G±0.02
A
L +0.01 0

0.1≦G<A/2

0.05mm increments

$\alpha=G$

G (Cone)

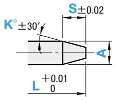


20<K≦60

1° increments

$\alpha=\frac{A}{2\tan K}$

T (Tapered)


K°±30′
S±0.02
A
L +0.01 0

$0.1 \leqq S < \frac{A}{2\tan K}$

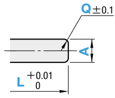
0.05mm increments

0<K≦45

1° increments

$\alpha=S$

R (R chamfering)

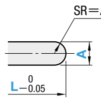


0.2≦Q<A/2

0.1mm increments

$\alpha=Q$

B (Spherical processed)


SR=A/2
A
L 0 −0.05

$\alpha=A/2$

H	Part Number				0.01mm increments						0.1mm increments		ℓ max.
	Type	Step	Shape	D	L min.	L max.	F min.	F max.	A min.	A max.	C	R	
3	CPZS— CPVS—	B C D E	S C G T R B	1	14.00	100.00	12.00	L−ℓ min. ℓmin. Refer to Step drawing	0.50	D>A	Only Step D is designated. $C<\frac{D-A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R \leqq \frac{D-A}{2}$ and R≧0.2	ℓ≦12×A and ℓ≦35
				1.5									
4				2									
5				2.5									
6				3					0.70				
7				3.5		120.00			1.00				
				4									
8				4.5									
				5		120.00 CPVS only 150.00							
9				5.5					1.50				
				6					2.00				
10				6.5									
				7									
11				8									
15				10									
18				13									
21				16									
25				20	30.00		28.00		5.00				

Order

Part Number	L	F	A	C・R	Tip size (K・S・G・Q)
CPZS−BS4	45.55	F40.00	A3.50		
CPVS−CC6	52.30	F42.50	A4.60		G1.0
CPZS−DG5	48.62	F37.55	A4.00	C0.2	K30
CPVS−ER6.5	55.65	F42.35	A4.50	R0.5	Q0.5

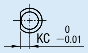
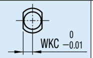
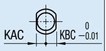
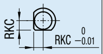
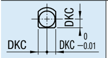
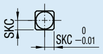
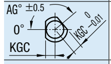
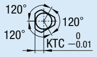
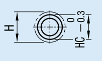
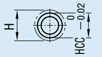
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	F(FC)	A(AAC)	C(CVC)・R	K・S・G・Q	(KC・WKC…etc.)	
CPVS−DC6	65.00	F55.00	A3.50	C0.5	G0.5	RC	KC3.0
CPVS−DS5	50.00	F38.00	A2.00	C0.3		TRN	

Alteration details P.495

Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2	
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	Quotation
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	
	HC	In case of D=2～3, 4.5, and 5, A min. is the machining limit, and AAC cannot be used. In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	

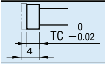
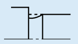
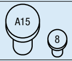
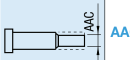
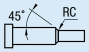
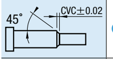
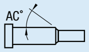
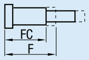
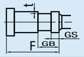
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter

Unit of designation 0.05mm increments possible

(2)To designate arbitrary key flat dimensions

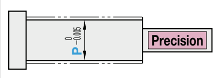
Unit of designation 0.1mm

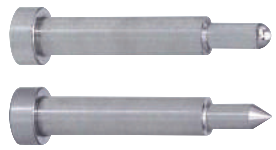
Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 Available when H≧2 Combination with SKC not available.	
	AAC	Extends the working limit of A min. AAC= 0.01mm increments ℓ≦10×AAC <table><tr><th>D</th><th>A min.</th><th>AAC min.</th></tr><tr><td>1～1.5</td><td>0.50</td><td>0.40</td></tr><tr><td>3.5～4</td><td>1.00</td><td>0.70</td></tr><tr><td>5.5</td><td>1.50</td><td>1.00</td></tr><tr><td>6～16</td><td>2.00</td><td>1.50</td></tr><tr><td>20</td><td>5.00</td><td>4.00</td></tr></table>In case of D=2～3, 4.5, and 5, Amin. is the machining limit, and AAC cannot be used.	Quotation
	RC	Changes R (normally ≦0.1) to R≦0.05. Designation method RC Available for Step B/C/D	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 Combination with CVC/RC not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	FC	F dimension becomes shorter than F min, and L dimension becomes shorter than L min. FC≧5mm It can be designated up to L min.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order P.496	

For details of a Gas Release Core Pin, which is a product similar to alteration GVC P.511

PRECISION TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (P) 0.005mm DESIGNATION TYPE—


P 0 −0.005
Precision

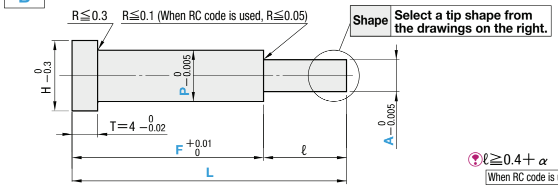


RoHS

M H	Part Number		
	Type	Step	Shape
SKD61 equivalent 48～52HRC	CPZBS—	B C D E	S C G T R B
SKH51 equivalent 58～60HRC	CPVBS—		

Step (Step type) Select from B～E in the drawing below.

B

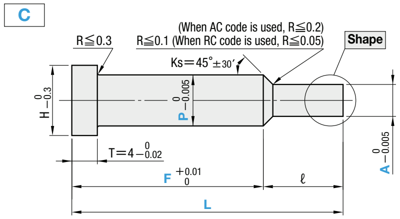

R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
Shape
Select a tip shape from the drawings on the right.
H 0 −0.3
P 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L
A 0 −0.005

⚠ $\ell \geqq 0.4+\alpha$

When RC code is used

$\ell \geqq 0.35+\alpha$

C

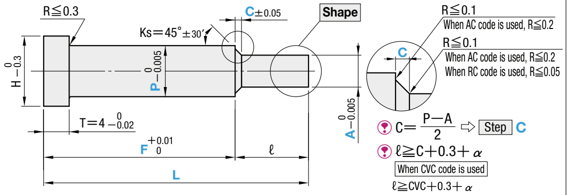

R≦0.3
(When AC code is used, R≦0.2)
R≦0.1 (When RC code is used, R≦0.05)
Shape
Ks=45°±30′
H 0 −0.3
P 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L
A 0 −0.005

⚠ $\ell \geqq \frac{P-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC^\circ}+0.3+\alpha$

D


R≦0.3
C±0.05
Shape
Ks=45°±30′
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
When RC code is used, R≦0.05
C
H 0 −0.3
P 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L
A 0 −0.005

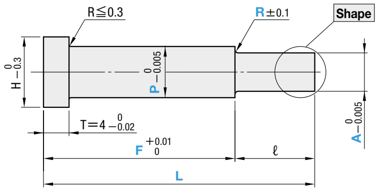
⚠ $C=\frac{P-A}{2}$ ⇨ Step C

⚠ $\ell \geqq C+0.3+\alpha$

When CVC code is used

$\ell \geqq CVC+0.3+\alpha$

E


R≦0.3
R±0.1
Shape
H 0 −0.3
P 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
L
A 0 −0.005

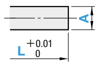
⚠ $P \geqq 0.900$

⚠ $\ell \geqq R+0.3+\alpha$

⚠ Refer to the Shape drawing for L tolerance

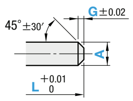
Shape (Tip shape)

S (Not processed)



$\alpha=0$

C (C chamfering)

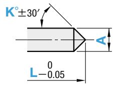

45°±30′
G±0.02
A
L +0.01 0

$0.1 \leqq G < A/2$

0.05mm increments

$\alpha=G$

G (Cone)

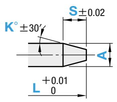


$20 < K \leqq 60$

1° increments

$\alpha=\frac{A}{2\tan K}$

T (Tapered)


S±0.02
K°±30′
A
L +0.01 0

$0.1 \leqq S < \frac{A}{2\tan K}$

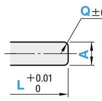
0.05mm increments

$0 < K \leqq 45$

1° increments

$\alpha=S$

R (R chamfering)

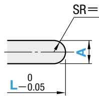


$0.2 \leqq Q < A/2$

0.1mm increments

$\alpha=Q$

B (Spherical processed)


SR=A/2
A
L 0 −0.05

$\alpha=A/2$

⚠ Non JIS material definition is listed on P.1351 - 1352

H	Part Number				0.01mm increments		0.005mm increments	0.01mm increments				0.1mm increments		ℓ max.
					L		min.Pmax.	F		A		C	R	
	Type	Step	Shape	No.	min.	max.		min.	max.	min.	max.			
3	CPZBS— CPVBS—	B C D E	S C G T R B	1	14.00	100.00	0.800～ 0.995	12.00	L−ℓ min. ⚠ ℓ min. Refer to Step drawing	0.50	P>A	Only Step D is designated. $C<\frac{P-A}{2}$ and $0.1 \leqq C \leqq 4.0$	Only Step E is designated. $R \leqq \frac{P-A}{2}$ and $R \geqq 0.2$	ℓ≦12×A and ℓ≦35
				1.5			1.000～ 1.495							
4				2			1.500～ 1.995							
5				2.5			2.000～ 2.495							
6				3			2.500～ 2.995			0.70				
7				3.5		120.00	3.000～ 3.495			1.00				
				4			3.500～ 3.995							
8				4.5			4.000～ 4.495							
				5		120.00	4.500～ 4.995							
9				5.5			5.000～ 5.495			1.50				
				6			5.500～ 5.995			2.00				
10				6.5			6.000～ 6.495							
				7		CPVBS only 150.00	6.500～ 6.995							
11				8			7.000～ 7.995							
15				10			8.000～ 9.995							
18				13			10.000～12.995							
21				16			13.000～15.995							
25				20	30.00		16.000～19.995	28.00		5.00				

⚠ Step E is No.1 (P≧0.900)～

Order

Part Number	L	P	F	A	C・R	Tip size (K・S・G・Q)
CPZBS—BS 4	45.55	P3.980	F40.00	A3.50		
CPVBS— CC 6	52.30	P5.565	F42.50	A4.60		G1.0
CPZBS— DG 5	48.62	P4.775	F37.55	A4.00	C0.2	K30
CPVBS—ER 6.5	55.65	P6.230	F42.35	A4.50	R0.5	Q0.5

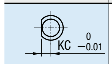
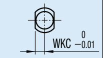
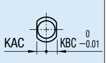
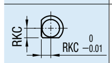
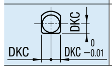
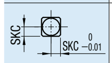
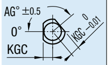
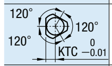
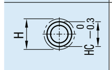
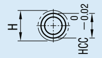
Days to Ship Quotation

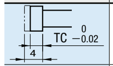
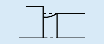
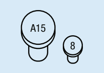
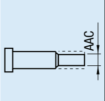
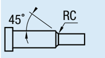
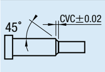
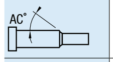
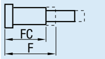
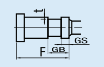
Price Quotation

Alterations

Part Number	L	P	F(FC)	A(AAC)	C(CVC)・R	K・S・G・Q	(KC・WKC···etc.)	
CPVBS—DC6	65.00	P5.750	F55.00	A3.50	C0.5	G0.5	RC	KC3.0
CPVBS—DS5	50.00	P4.895	F38.00	A2.00	C0.3		TRN	

Alteration details ☞ P.495

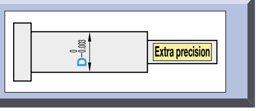
Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2		
	WKC	Two flats cutting P/2≦WKC<H/2	About Designation Unit for Key Flat Cutting	
	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	(1)To align the key flat with the shaft diameter	
	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	Unit of designation 0.0025mm increments possible	
	DKC	Three flats cutting P/2≦DKC<H/2		Quotation
	SKC	Four flats cutting P/2≦SKC<H/2	(2)To designate arbitrary key flat dimensions	
	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	Unit of designation 0.1mm	
	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments P≦HC<H ⚠ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3		

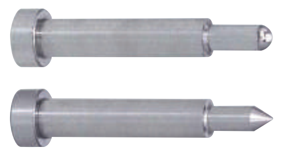
<table>
<tr><th>Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td></td><td>TC</td><td>Head thickness change
TC=0.1mm increments 1.5≦TC<4
(Dimensions L and F remain unchanged)
4−TC≦Lmax.−L</td><td></td></tr>
<tr><td></td><td>TRN</td><td>Relief under the head
(Makes plate chamfering unnecessary)</td><td></td></tr>
<tr><td></td><td>NHC</td><td>Numbering on the head
How to order ☞ P.496
⚠ Available when H≧2
⊗ Combination with SKC not available.</td><td></td></tr>
<tr><td></td><td>AAC</td><td>Extends the working limit of A min.
⚠ AAC=0.01mm increments
⚠ ℓ≦10×AAC
<table>
<tr><th>No.</th><th>A min.</th><th>AAC min.</th></tr>
<tr><td>1～1.5</td><td>0.50</td><td>0.40</td></tr>
<tr><td>3.5～4</td><td>1.00</td><td>0.70</td></tr>
<tr><td>5.5</td><td>1.50</td><td>1.00</td></tr>
<tr><td>6～16</td><td>2.00</td><td>1.50</td></tr>
<tr><td>20</td><td>5.00</td><td>4.00</td></tr>
</table>
⊗ In case of No.=2～3・4.5・5, A min. is the machining limit, and AAC cannot be used.</td><td>Quotation</td></tr>
<tr><td></td><td>RC</td><td>Changes R (normally ≦0.1) to R≦0.05.
Designation method RC
⚠ Available for Step B/C/D</td><td></td></tr>
<tr><td></td><td>CVC</td><td>C dimension can be designated at 0.01mm increments.
0.10≦CVC≦1.00
CVC=0.01mm increments
⚠ Available for Step D</td><td></td></tr>
<tr><td></td><td>AC</td><td>Changes the standard angle (Ks=45°).
AC=1° increments ⚠ Available for Step C・D
⚠ 30≦AC≦60 ⊗ Combination with CVC/RC not available.
⚠ When Step D, C≦1.0, A+2(C×tanAC°)<P</td><td></td></tr>
<tr><td></td><td>FC</td><td>F dimension becomes shorter than F min., and L dimension becomes shorter than L min., too.
FC≧5mm
⚠ It can be designated up to L min.=6.5mm.</td><td></td></tr>
<tr><td></td><td>GVC</td><td>Gas vent machining
GS・GB=1mm increments
⚠ Available when P≧2.00
⚠ 2≦GS≦10 GS+2≦GB≦30
F min.≦F−GB How to order ☞ P.496</td><td></td></tr>
</table>

⚠ For details of a Gas Release Core Pin, which is a product similar to alteration GVC, ☞ P.513

EXTRA PRECISION TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (D) SELECTION TYPE—

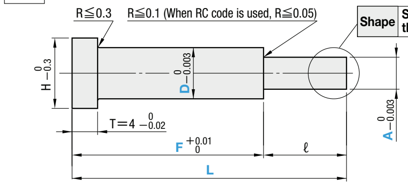

D-0.003
Extra precision



M H	Type	Step	Shape
SKH51 equivalent 58～60HRC	CPMS—	B C D E	S C G T R B

Step (Step type) Select from B～E in the drawing below.

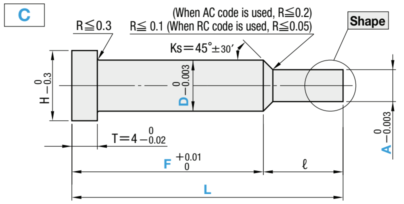
B


R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
Shape Select a tip shape from the drawings on the right.
H 0 −0.3
D 0 −0.003
A 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
L

ℓ≧0.4+α

When RC code is used ℓ≧0.35+α

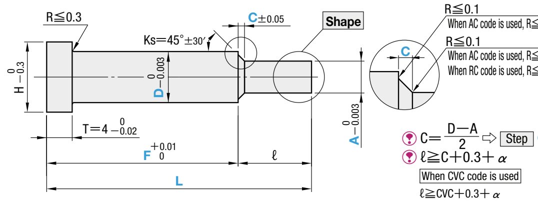
C


R≦0.3
(When AC code is used, R≦0.2)
R≦ 0.1 (When RC code is used, R≦0.05)
Ks=45°±30′
Shape
H 0 −0.3
D 0 −0.003
A 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
L

$\ell \geqq \frac{D-A}{2}+0.3+\alpha$

When AC code is used $\ell \geqq \frac{D-A}{2\tan AC^\circ}+0.3+\alpha$

D

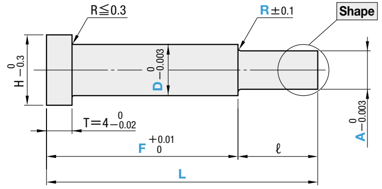

R≦0.3
C±0.05
Ks=45°±30′
Shape
R≦0.1 When AC code is used, R≦0.2
R≦0.1 When AC code is used, R≦0.2 When RC code is used, R≦0.05
C
H 0 −0.3
D 0 −0.003
A 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
L

$C=\frac{D-A}{2}$ ⇨ Step C

ℓ≧C+0.3+α

When CVC code is used ℓ≧CVC+0.3+α

E

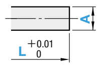

R≦0.3
R±0.1
Shape
H 0 −0.3
D 0 −0.003
A 0 −0.003
T=4 0 −0.02
F +0.01 0
ℓ
L

ℓ≧R+0.3+α

Refer to the Shape drawing for L tolerance

Shape (Tip shape)

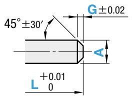
S (Not processed)



α=0

When LKC code is used $L^{+0.005}_{0}$

C (C chamfering)


45°±30′
G±0.02
A
L +0.01 0

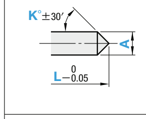
0.1≦G<A/2

0.05mm increments

α=G

When LKC code is used $L^{+0.005}_{0}$

G (Cone)

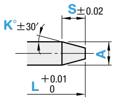


20<K≦60

1° increments

$\alpha=\frac{A}{2\tan K}$

T (Tapered)


K°±30′
S±0.02
A
L +0.01 0

$0.1 \leqq S < \frac{A}{2\tan K}$

0.05mm increments

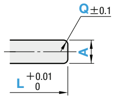
0<K≦45

1° increments

α=S

When LKC code is used $L^{+0.005}_{0}$

R (R chamfering)



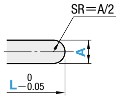
0.2≦Q<A/2

0.1mm increments

α=Q

When LKC code is used $L^{+0.005}_{0}$

B (Spherical processed)


SR=A/2
A
L 0 −0.05

α=A/2

Non JIS material definition is listed on P.1351 - 1352

H	Part Number Type	Step	Shape	D	0.01mm increments L min.	L max.	F min.	F max.	0.001mm increments A min.	A max.	0.1mm increments C	R	ℓ max.
3	CPMS—	B C D E	S C G T R B	1	14.00	100.00	12.00	L−ℓ min. ℓ min. Refer to Step drawing	0.500	D>A	Only Step D is designated. $C<\frac{D-A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R\leqq\frac{D-A}{2}$ and R≧0.2	ℓ≦12×A and ℓ≦35
				1.5									
4				2									
5				2.5									
6				3					0.700				
7				3.5					1.000				
				4									
8				4.5									
				5									
9				5.5					1.500				
				6					2.000				
10				6.5									
				7									
11				8									
15				10									
18				13									

Order

Part Number		L		F		A		C・R		Tip size (K・S・G・Q)
CPMS−BS 4	—	45.55	—	F40.00	—	A3.500				
CPMS−CC 6	—	52.30	—	F42.50	—	A4.600			—	G1.0
CPMS−DG 5	—	48.62	—	F37.55	—	A4.000	—	C0.2	—	K30
CPMS−ER 6.5	—	55.65	—	F42.35	—	A4.500	—	R0.5	—	Q0.5

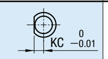
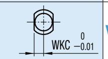
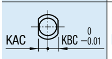
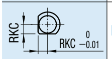
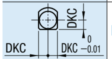
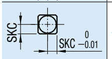
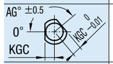
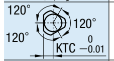
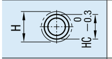
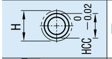
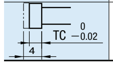
Days to Ship Quotation

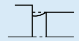
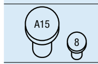
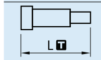
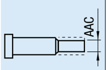
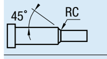
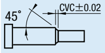
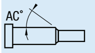
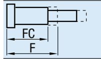
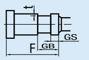
Price Quotation

Alterations

Part Number		L		F(FC)		A(AAC)		C(CVC)・R		K・S・G・Q		(KC・WKC···etc.)
CPMS−DC6	—	65.00	—	F55.00	—	A3.505	—	C0.5	—	G0.5	—	RC — KC3.0
CPMS−DS5	—	50.00	—	F38.00	—	A2.000	—	C0.3	—		—	TRN

Alteration details P.495

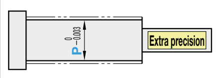
Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments		
	KTC	Three flats cutting at 120° D/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3		
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	Quotation
	NHC	Numbering on the head How to order P.496 Available when H≧2 Combination with SKC not available.	
	LKC	L dimension tolerance alternation $^{+0.01}_{0}$ ⇨ L $^{+0.005}_{0}$ (L designation in 0.005mm increments possible) Available when 1.5≦D≦5 Combination with FC not available. Available for Shape S・C・T・R	
	AAC	Extends the working limit of A min. AAC =0.001mm increments ℓ≦10×AAC In case of No.=2～3・4.5・5, A min. is the machining limit, and AAC cannot be used.	
	RC	Changes R (normally ≦0.1) to R≦0.05. Designation method RC Available for Step B/C/D	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 Combination with CVC/RC not available. When Step D, C≦1.0, A+2(C×tanAC°)<D	
	FC	F dimension becomes shorter than F min., and L dimension becomes shorter than L min., too. FC≧5mm It can be designated up to L min.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order P.496	

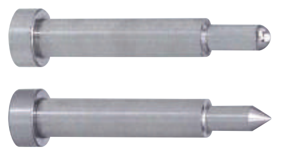
D	A min.	AAC min.
1～1.5	0.500	0.400
3.5～4	1.000	0.700
5.5	1.500	1.000
6～13	2.000	1.500

EXTRA PRECISION TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (P) DESIGNATION (0.001mm increments) TYPE—


P $^{0}_{-0.001}$
Extra precision

❗ Non JIS material definition is listed on P.1351 - 1352

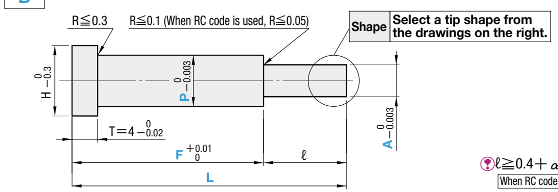


RoHS

M	Part Number		
H	Type	Step	Shape
SKH51 equivalent 58～60HRC	CPMBS—	B C D E	S C G T R B

Step (Step type) Select from B～E in the drawing below.

B

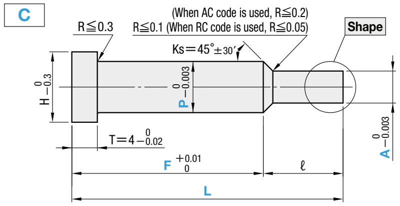

R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
Shape
Select a tip shape from the drawings on the right.
H $^{0}_{-0.3}$
P $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
L
A $^{0}_{-0.003}$

❗ $\ell \geqq 0.4+\alpha$

When RC code is used

$\ell \geqq 0.35+\alpha$

C

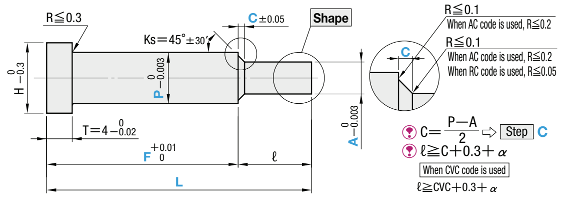

(When AC code is used, R≦0.2)
R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
Shape
Ks=45°±30′
H $^{0}_{-0.3}$
P $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
L
A $^{0}_{-0.003}$

❗ $\ell \geqq \frac{P-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC^{\circ}}+0.3+\alpha$

D


R≦0.3
C ±0.05
Shape
Ks=45°±30′
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
When RC code is used, R≦0.05
C
H $^{0}_{-0.3}$
P $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
L
A $^{0}_{-0.003}$

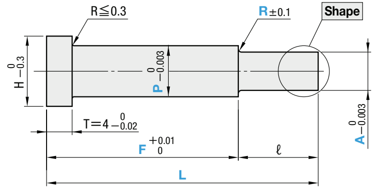
❗ $C=\frac{P-A}{2}$ ⇨ Step C

❗ $\ell \geqq C+0.3+\alpha$

When CVC code is used

$\ell \geqq CVC+0.3+\alpha$

E


R≦0.3
R ±0.1
Shape
H $^{0}_{-0.3}$
P $^{0}_{-0.003}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
ℓ
L
A $^{0}_{-0.003}$

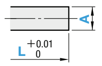
❗ P≧0.900

❗ $\ell \geqq R+0.3+\alpha$

❗ Refer to the Shape drawing for L tolerance

Shape (Tip shape)

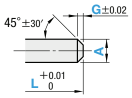
S (Not processed)



$\alpha=0$

When LKC code is used L $^{+0.005}_{0}$

C (C chamfering)


45°±30′
G ±0.02
A
L $^{+0.01}_{0}$

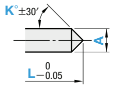
$0.1 \leqq G < A/2$

0.05mm increments

$\alpha=G$

When LKC code is used L $^{+0.005}_{0}$

G (Cone)

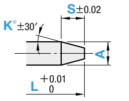


$20 < K \leqq 60$

1° increments

$\alpha=\frac{A}{2\tan K}$

T (Tapered)


S ±0.02
K°±30′
A
L $^{+0.01}_{0}$

$0.1 \leqq S < \frac{A}{2\tan K}$

0.05mm increments

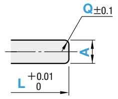
$0 < K \leqq 45$

1° increments

$\alpha=S$

When LKC code is used L $^{+0.005}_{0}$

R (R chamfering)



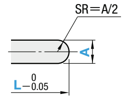
$0.2 \leqq Q < A/2$

0.1mm increments

$\alpha=Q$

When LKC code is used L $^{+0.005}_{0}$

B (Spherical processed)


SR=A/2
A
L $^{0}_{-0.05}$

$\alpha=A/2$

H	Part Number				0.01mm increments		0.001mm increments	0.01mm increments		0.001mm increments		0.1mm increments		ℓ max.
					L		min.P max.	F		A		C	R	
	Type	Step	Shape	No.	min.	max.		min.	max.	min.	max.			
3	CPMBS—	B C D E	S C G T R B	1	14.00	100.00	0.800～ 0.999	12.00	L−ℓ min. ❗ ℓ min. Refer to Step drawing	0.500	P>A	Only Step D is designated. $C<\frac{P-A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R \leqq \frac{P-A}{2}$ and R≧0.2	ℓ≦12×A and ℓ≦35
				1.5			1.000～ 1.499							
4				2			1.500～ 1.999							
5				2.5			2.000～ 2.499							
6				3			2.500～ 2.999			0.700				
7				3.5			3.000～ 3.499			1.000				
				4			3.500～ 3.999							
8				4.5			4.000～ 4.499							
				5			4.500～ 4.999							
9				5.5			5.000～ 5.499			1.500				
				6			5.500～ 5.999			2.000				
10				6.5			6.000～ 6.499							
				7			6.500～ 6.999							
11				8			7.000～ 7.999							
15				10			8.000～ 9.999							
18				13			10.000～12.999							

Order

Part Number	L	P	F	A	C・R	Tip size (K・S・G・Q)
CPMBS—BS 4	45.55	P3.980	F40.00	A3.500		
CPMBS—CC 6	52.30	P5.560	F42.50	A4.600		G1.0
CPMBS—DG 5	48.62	P4.770	F37.55	A4.000	C0.2	K30
CPMBS—ER 6.5	55.65	P6.230	F42.35	A4.500	R0.5	Q0.5

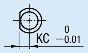
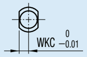
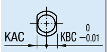
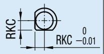
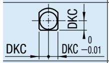
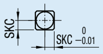
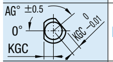
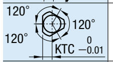
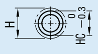
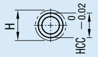
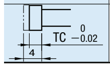
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	F(FC)	A(AAC)	C(CVC)・R	K・S・G・Q	(KC・WKC···etc.)
CPMBS—DC6	65.00	P5.750	F55.00	A3.500	C0.5	G0.5	RC —KC3.0
CPMBS—DS5	50.00	P4.895	F38.00	A2.000	C0.3		TRN

Alteration details ☞ P.495

Alterations	Code	Spec.	1Code
	KC	Single flat cutting P/2≦KC<H/2	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2	
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting P/2≦RKC<H/2	
 DKC DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting P/2≦DKC<H/2	
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting P/2≦SKC<H/2	
 AG° ±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments	
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° P/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments P≦HC<H ❗ In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	

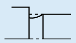
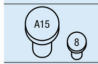
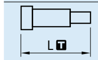
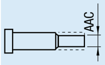
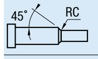
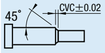
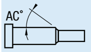
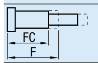
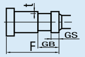
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter

Unit of designation 0.0005mm increments possible

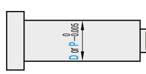
(2)To designate arbitrary key flat dimensions

Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	Quotation
	NHC	Numbering on the head How to order ☞ P.496 ❗ Available when H≧2 ⊗ Combination with SKC not available.	
	LKC	L dimension tolerance alternation $^{+0.01}_{0}$ ⇨ L $^{+0.005}_{0}$ (L designation in 0.005mm increments possible) ❗ Available when 1.500≦P≦5.000 ⊗ Combination with FC not available. ❗ Available for Shape S・C・T・R	
	AAC	Extends the working limit of A min. ❗ AAC= 0.001mm increments ❗ ℓ≦10×AAC No. / A min. / AAC min. 1～1.5 / 0.500 / 0.400 3.5～4 / 1.000 / 0.700 5.5 / 1.500 / 1.000 6～13 / 2.000 / 1.500 ⊗ In case of No.=2～3・4.5・5, A min.is the machining limit, and AAC cannot be used.	
	RC	Changes R (normally ≦0.1) to R≦0.05. Designation method RC ❗ Available for Step B・C・D	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments ❗ Available for Step D	
	AC	Changes the standard angle (Ks=45°). AC=1° increments ❗ Available for Step C・D ❗ 30≦AC≦60 ⊗ Combination with CVC/RC not available. ❗ When Step D, C≦1.0, A+2(C×tanAC°)<P	
	FC	F dimension becomes shorter than F min., and L dimension becomes shorter than L min., too. FC≧5mm ❗ It can be designated up to L min.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments ❗ Available when P≧2.00 ❗ 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order ☞ P.496	

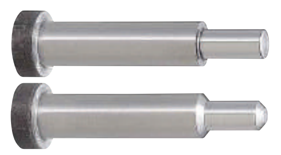
TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—LAPPED・SHAFT DIAMETER (D) SELECTION／SHAFT DIAMETER (P) DESIGNATION (0.01mm INCREMENTS) TYPE—



Standard

Non JIS material definition is listed on P.1351 - 1352



Enlarged photograph of tip

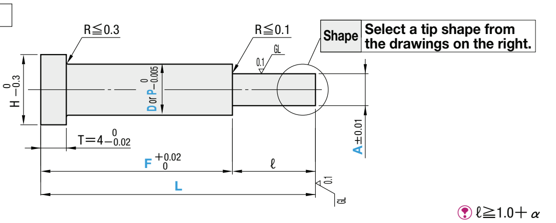
RoHS

The ℓ dimension face and the tip face of this product are lapped.

M H	Part Number Type: Shaft diameter (D) selection	Part Number Type: Shaft diameter (P) designation	Step	Shape
SKD61 equivalent 48~52HRC	L−CPPS−	L−CPPBS−	B C D E	S C G T R B
SKH51 equivalent 58~60HRC	L−CPHS−	L−CPHBS−		

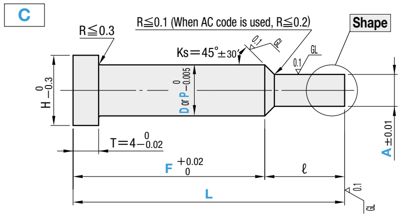
Step (Step type) Select from B~E in the drawing below.

B


R≦0.3
R≦0.1
Shape
Select a tip shape from the drawings on the right.
0.1
GL
H −0.3 0
D or P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A±0.01
0.1
GL

ℓ≧1.0+α

C

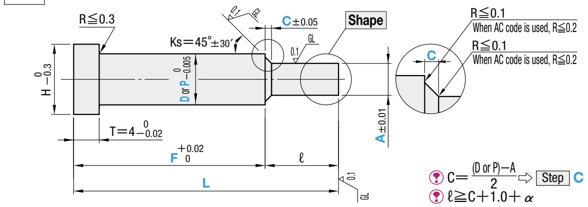

R≦0.3
R≦0.1 (When AC code is used, R≦0.2)
Shape
Ks=45°±30′
0.1
GL
H −0.3 0
D or P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A±0.01
0.1
GL

$ℓ≧\frac{(D\ or\ P)−A}{2}+1.0+α$

When AC code is used

$ℓ≧\frac{(D\ or\ P)−A}{2tanAC°}+1.0+α$

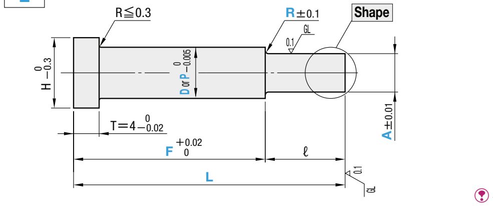
D


R≦0.3
C±0.05
Shape
Ks=45°±30′
0.1
GL
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
C
H −0.3 0
D or P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A±0.01
0.1
GL

$C=\frac{(D\ or\ P)−A}{2}$ ⇨ Step C

ℓ≧C+1.0+α

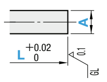
E


R≦0.3
R±0.1
Shape
0.1
GL
H −0.3 0
D or P −0.005 0
T=4 −0.02 0
F +0.02 0
ℓ
L
A±0.01
0.1
GL

ℓ≧R+1.0+α

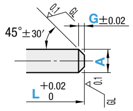
Shape (Tip shape)

S (Not processed)


A
L +0.02 0
0.1
GL

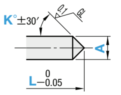
α=0

C (C chamfering)


45°±30′
0.1
GL
G±0.02
A
L +0.02 0
0.1
GL

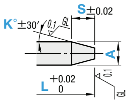
0.1≦G<A/2
0.1mm increments
α=G

G (Cone)


K°±30′
0.1
GL
A
L 0 −0.05

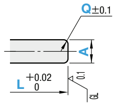
20<K≦60
1° increments
$α=\frac{A}{2tanK}$

T (Tapered)


K°±30′
0.1
GL
S±0.02
A
L +0.02 0
0.1
GL

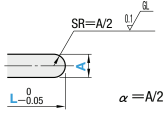
$0.1≦S<\frac{A}{2tanK}$
0.1mm increments
0<K≦45
1° increments
α=S

R (R chamfering)


Q±0.1
A
L +0.02 0
0.1
GL

0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)


SR=A/2
0.1
GL
A
L 0 −0.05

α=A/2

Refer to the Shape drawing for L tolerance

Order

Part Number	—	L	—	P	—	F	—	A	—	C・R	—	Tip size (K・S・G・Q)
Shaft diameter (D) selection type L−CPPS −BS4	—	45.55			—	F40.00	—	A3.50				
Shaft diameter (P) designation type L−CPPBS−BS4	—	45.55	—	P3.98	—	F40.00	—	A3.50				

■Shaft diameter (D) selection type

H	Part Number Type	Step	Shape	D	L (0.01mm increments) min.	L max.	F min.	F max.	A min.	A max.	C (0.1mm increments)	R (0.1mm increments)	ℓ max.
3	L−CPPS− L−CPHS−	B C D E	S C G T R B	1.5	12.00	100.00	10.00	L−ℓ min. ℓ min. Refer to Step drawing	1.00	D>A	Only Step D is designated. $C<\frac{D−A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R≦\frac{D−A}{2}$ and R≧0.2	ℓ≦A×6 and ℓ≦30
4				2									
5				2.5									
6				3									
7				3.5		120.00							
				4									
8				4.5									
				5									
9				5.5					1.50				
				6					2.00				

■Shaft diameter (P) designation type

H	Part Number Type	Step	Shape	No.	L (0.01mm increments) min.	L max.	min.P max.	F min.	F max.	A min.	A max.	C (0.1mm increments)	R (0.1mm increments)	ℓmax.
3	L−CPPBS− L−CPHBS−	B C D E	S C G T R B	1.5	12.00	100.00	1.30~1.49	10.00	L−ℓ min. ℓ min. Refer to Step drawing	1.00	P>A	Only Step D is designated. $C<\frac{P−A}{2}$ and 0.1≦C≦4.0	Only Step E is designated. $R≦\frac{P−A}{2}$ and R≧0.2	ℓ≦A×6 and ℓ≦30
4				2			1.50~1.99							
5				2.5			2.00~2.49							
6				3			2.50~2.99							
7				3.5		120.00	3.00~3.49							
				4			3.50~3.99							
8				4.5			4.00~4.49							
				5			4.50~4.99							
9				5.5			5.00~5.49			1.50				
				6			5.50~5.99			2.00				

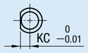
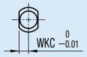
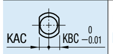
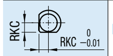
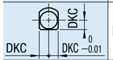
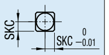
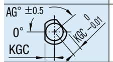
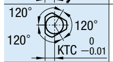
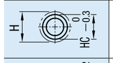
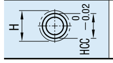
Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	L	—	P	—	F	—	A(AAC)	—	C(CVC)・R(RE)	—	K・S・G・Q	—	(KC・WKC…etc.)
Shaft diameter (D) selection type L−CPPS −DC6	—	65.00			—	F55.00	—	A3.50	—	C0.5	—	G0.5	—	KC3.0−TC3.0
Shaft diameter (P) designation type L−CPPBS−DC6	—	65.00	—	P5.75	—	F55.00	—	A3.50	—	C0.5	—	G0.5	—	KC3.0−TC3.0

Alteration details P.495

Alterations	Code	Spec.	1Code
	KC	Single flat cutting (D or P)/2≦KC<H/2	
	WKC	Two flats cutting (D or P)/2≦WKC<H/2	
 KAC KBC 0 −0.01	KAC KBC	Varied width parallel flats cutting (D or P)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
 RKC RKC 0 −0.01	RKC	Two flats (right angled) cutting (D or P)/2≦RKC<H/2	
 DKC DKC DKC 0 −0.01	DKC	Three flats cutting (D or P)/2≦DKC<H/2	Quotation
 SKC SKC 0 −0.01	SKC	Four flats cutting (D or P)/2≦SKC<H/2	
 AG° ±0.5 0° KGC KGC 0 −0.01	KGC	Two flats (angled) cutting (D or P)/2≦KGC<H/2 0<AG<360 AG=1° increments	
 120° 120° 120° KTC 0 −0.01	KTC	Three flats cutting at 120° (D or P)/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments (D or P)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (D or P)+0.5≦HCC<H−0.3	

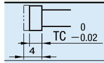
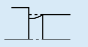
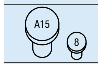
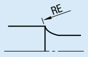
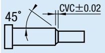
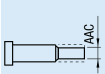
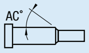
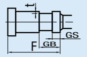
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter

Unit of designation
Shaft diameter (D) selection type 0.05mm increments possible
Shaft diameter (P) designation type 0.005mm increments possible

(2)To designate arbitrary key flat dimensions

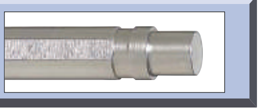
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 Combination with SKC not available.	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is +0.05 0 Available for Step E	Quotation
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AAC	Extends the working limit of A min. AAC=0.01mm increments ℓ≦5×AAC In case of (D or No.)=2~3・4.5・5, A min. is the machining limit, and AAC cannot be used.	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 When Step D, C≦1.0, A+2 (C×tanAC°)<(D or P)	
	GVC	Gas vent machining GS・GB=1mm increments Available when (D or P)≧2 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order P.496	

(D or No.)	A min.	AAC min.
1.5	1.00	0.60
3.5~4	1.00	0.70
5.5	1.50	1.00
6	2.00	1.50

GAS RELEASE TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (D) SELECTION TYPE—



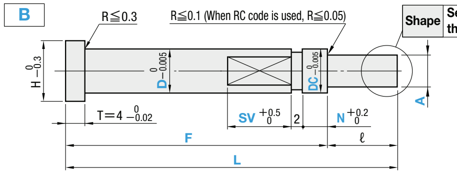
Non JIS material definition is listed on P.1351 - 1352

RoHS

M H	Type	Step	Shape	Group	A	L・F
SKD61 equivalent 48～52HRC	GV−CPPS−	B C D E	S C G T R B	Standard	$^{0}_{-0.01}$	$^{+0.02}_{0}$ (G B only $^{0}_{L-0.05}$)
SKH51 equivalent 58～60HRC	GV−CPHS−					
SKD61 equivalent 48～52HRC	GV−CPZS−			Precision	$^{0}_{-0.005}$	$^{+0.01}_{0}$ (G B only $^{0}_{L-0.05}$)
SKH51 equivalent 58～60HRC	GV−CPVS−					

Step (Step type) Select from B～E in the drawing below.

B

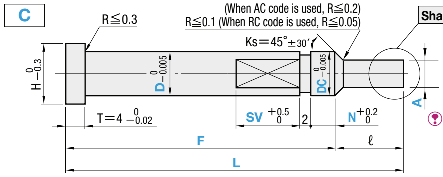

R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
H $^{0}_{-0.3}$
D $^{0}_{-0.005}$
DC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
A
F
ℓ
L

Shape Select a tip shape from the drawings on the right.

ℓ≧0.4+α

When RC code is used
ℓ≧0.35+α

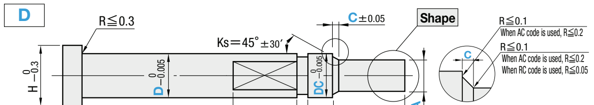
C

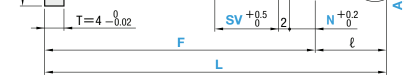

R≦0.3
(When AC code is used, R≦0.2)
R≦0.1 (When RC code is used, R≦0.05)
Ks=45°±30′
Shape
H $^{0}_{-0.3}$
D $^{0}_{-0.005}$
DC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
A
F
ℓ
L

$\ell \geqq \frac{D-A}{2}+0.3+\alpha$

When AC code is used
$\ell \geqq \frac{D-A}{2\tan AC^{\circ}}+0.3+\alpha$

D


R≦0.3
Ks=45°±30′
C±0.05
Shape
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
When RC code is used, R≦0.05
C
H $^{0}_{-0.3}$
D $^{0}_{-0.005}$
DC $^{0}_{-0.005}$

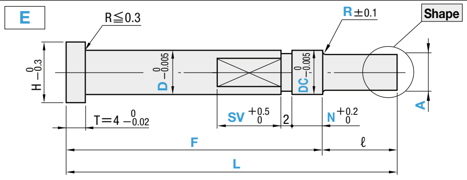

T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
A
F
ℓ
L

$C=\frac{D-A}{2}$ ⇨ Step C

ℓ≧C+0.3+α

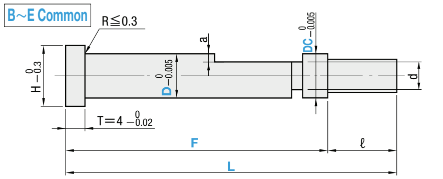
When CVC code is used
ℓ≧CVC+0.3+α

E


R≦0.3
R±0.1
Shape
H $^{0}_{-0.3}$
D $^{0}_{-0.005}$
DC $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
A
F
ℓ
L

ℓ≧R+0.3+α

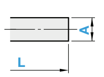
B～E Common


R≦0.3
a
DC $^{0}_{-0.005}$
H $^{0}_{-0.3}$
D $^{0}_{-0.005}$
d
T=4 $^{0}_{-0.02}$
F
ℓ
L

D	d	a
1 ～ 2.5	D−0.2	0.1
3 ～ 4	D−0.4	0.2
4.5～ 5	D−0.6	0.3
5.5～13	D−1.0	0.5

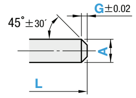
Shape (Tip shape)

S (Not processed)



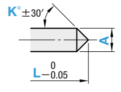
α=0

C (C chamfering)


45°±30′
G±0.02
A
L

0.1≦G<A/2
Standard 0.1mm increments
Precision 0.05mm increments
α=G

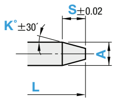
G (Cone)



20<K≦60
1° increments
$\alpha=\frac{A}{2\tan K}$

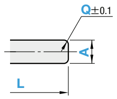
T (Tapered)

$0.1 \leqq S < \frac{A}{2\tan K}$
Standard 0.1mm increments
Precision 0.05mm increments



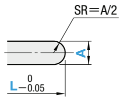
0<K≦45
1° increments
α=S

R (R chamfering)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)


SR=A/2
A
L $^{0}_{-0.05}$

α=A/2

H	Type	Step	Shape	D	L (0.01mm increments)	F (0.01mm increments)	A min. (0.01mm increments)	A max. (0.01mm increments)	C (0.1mm increments)	R (0.1mm increments)	DC (0.005mm increments)	N (0.1mm increments)	SV (0.5mm increments)	ℓ max.
3	GV−CPPS− GV−CPHS− GV−CPZS− GV−CPVS−	B C D E	S C G T R B	1	16.50 ～ 100.00	14.50 ～ L−ℓ min. ℓ min. Refer to Step drawing	0.50	DC>A	Only Step D is designated. $C<\frac{D-A}{2}$ and ※ 0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	Only Step E is designated. $R \leqq \frac{D-A}{2}$ and R≧0.2	(D−0.08)≦DC≦D When DC=D, designation of DCX.	0.3～10.0	2.0～50.0	Standard ℓ≦10×A and ℓ≦35 Precision ℓ≦12×A and ℓ≦35
				1.5								F−(2+SV+N)≧10		
4				2										
5				2.5										
6				3			0.70							
7				3.5	16.50 ～ 120.00		1.00					0.5～15.0	2.0～60.0	
				4								F−(2+SV+N)≧10		
8				4.5										
				5										
9				5.5			1.50							
				6			2.00							
10				7										
11				8										
15				10										
18				13										

Order

Part Number	L	F	A	C・R	Tip size (K・S・G・Q)	DC(DCX)	N	SV
GV−CPPS−BS5	58.00	F40.00	A4.98			DC4.990	N2	SV10
GV−CPVS−DR6	46.00	F38.00	A4.98	C0.3	Q1.0	DCX	N4	SV15

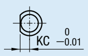
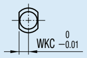
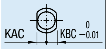
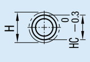
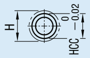
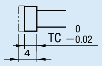
Days to Ship Quotation

Price Quotation

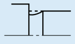
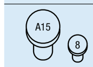
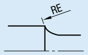
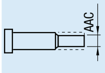
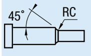
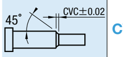
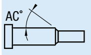
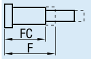
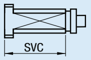
Alterations

Part Number	L	F	A(AAC)	C(CVC)・R(RE)	Tip size (K・S・G・Q)	DC(DCX)	N	SV(SVC)	(KC・WKC…etc.)
GV−CPHS−BC6	50.00	F40.00	A5.00		G1.0	DCX	N4	SV10	HC8.0
GV−CPPS−CS5	58.00	F50.00	A4.80			DC4.690	N2	SV15	NHC−23

Alteration details P.495

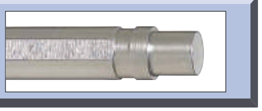
Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L	

About Designation Unit for Key Flat Cutting
(1)To align the key flat with the shaft diameter
Unit of designation 0.05mm increments possible
(2)To designate arbitrary key flat dimensions
Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 Available when H≧2	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Standard Available for Step E	
	AAC	Extends the working limit of A min. AAC =0.01mm increments ℓ≦10×AAC D: 1～1.5, A min. 0.50, AAC min. 0.40 D: 3.5～4, A min. 1.00, AAC min. 0.70 D: 5.5, A min. 1.50, AAC min. 1.00 D: 6～13, A min. 2.00, AAC min. 1.50 In case of D=2～3・4.5・5, Amin. is the machining limit, and AAC cannot be used.	Quotation
	RC	Changes R (normally ≦0.1) to R≦0.05. Designation method RC Precision Available for Step B・C・D	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 Combination with CVC/RC not available. When Step D, C≦1.0, A+2(C×tanAC°)<DC	
	FC	F dimension becomes shorter than F min.,and L dimension becomes shorter than L min., too. FC≧5mm It can be designated up to L min.=6.5mm. Available for Precision	
	SVC	Extend the flat section SV to the bottom. Available when D≧2 When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

GAS RELEASE TAPERLESS ONE-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (P) DESIGNATION TYPE—

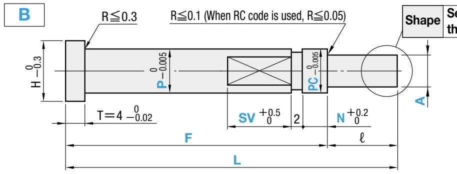


M H	Type	Step	Shape	Group	A	L・F
SKD61 equivalent 48～52HRC	GV−CPPBS−	B C D E	S C G T R B	Standard	0 −0.01	+0.02 0 (G B only 0 L−0.05)
SKH51 equivalent 58～60HRC	GV−CPHBS−					
SKD61 equivalent 48～52HRC	GV−CPZBS−			Precision	0 −0.005	+0.01 0 (G B only 0 L−0.05)
SKH51 equivalent 58～60HRC	GV−CPVBS−					

Step (Step type) Select from 1A～1D in the drawing below

B

Shape Select a tip shape from the drawings on the right.


R≦0.3
R≦0.1 (When RC code is used, R≦0.05)
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
PC $^{0}_{-0.005}$
A
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F
ℓ
L

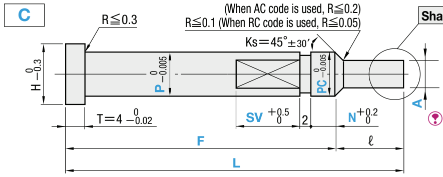
ℓ≧0.4+α

When RC code is used

ℓ≧0.35+α

C

Shape


R≦0.3
(When AC code is used, R≦0.2)
R≦0.1 (When RC code is used, R≦0.05)
Ks=45°±30′
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
PC $^{0}_{-0.005}$
A
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F
ℓ
L

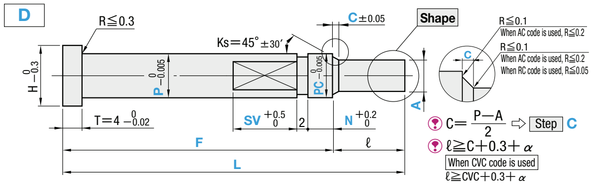
$\ell \geqq \frac{P-A}{2}+0.3+\alpha$

When AC code is used

$\ell \geqq \frac{P-A}{2\tan AC^\circ}+0.3+\alpha$

D

Shape


R≦0.3
C±0.05
Ks=45°±30′
R≦0.1
When AC code is used, R≦0.2
R≦0.1
When AC code is used, R≦0.2
When RC code is used, R≦0.05
C
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
PC $^{0}_{-0.005}$
A
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F
ℓ
L

$C=\frac{P-A}{2}$ ⇨ Step C

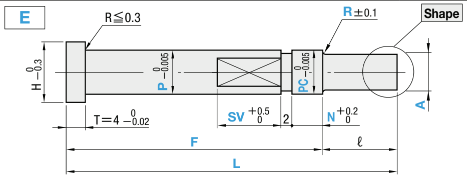
ℓ≧C+0.3+α

When CVC code is used

ℓ≧CVC+0.3+α

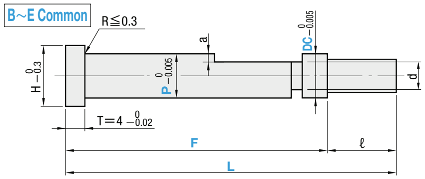
E

Shape


R≦0.3
R±0.1
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
PC $^{0}_{-0.005}$
A
T=4 $^{0}_{-0.02}$
SV $^{+0.5}_{0}$
2
N $^{+0.2}_{0}$
F
ℓ
L

ℓ≧R+0.3+α

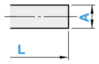
B～E Common


R≦0.3
a
DC $^{0}_{-0.005}$
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
d
T=4 $^{0}_{-0.02}$
F
ℓ
L

P	d	a
0.800～0.995	P−0.1	0.05
1.000～2.495	P−0.2	0.1
2.500～3.995	P−0.4	0.2
4.000～4.995	P−0.6	0.3
5.000～12.995	P−1.0	0.5

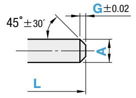
Shape (Tip shape)

S (Not processed)



α=0

C (C chamfering)


45°±30′
G±0.02
A
L

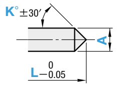
0.1≦G<A/2

Standard 0.1mm increments

Precision 0.05mm increments

α=G

G (Cone)



20<K≦60

1° increments

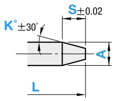
$\alpha=\frac{A}{2\tan K}$

T (Tapered)

$0.1\leqq S<\frac{A}{2\tan K}$

Standard 0.1mm increments

Precision 0.05mm increments

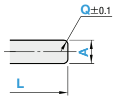


0<K≦45

1° increments

α=S

R (R chamfering)

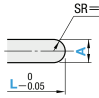


0.2≦Q<A/2

0.1mm increments

α=Q

B (Spherical processed)


SR=A/2
A
L $^{0}_{-0.05}$

α=A/2

Non JIS material definition is listed on P.1351 - 1352

H	Type	Step	Shape	No.	L (0.01mm increments)	P Standard (0.01mm increments)	P Precision (0.005mm increments)	F (0.01mm increments)	A min. (0.01mm increments)	A max.	C (0.1mm increments)	R (0.1mm increments)	PC (0.005mm increments)	N (0.1mm increments)	SV (0.5mm increments)	ℓ max.
3	GV−CPPBS− GV−CPHBS− GV−CPZBS− GV−CPVBS−	B C D E	S C G T R B	1	16.50～100.00	0.80～0.99	0.800～0.995	14.50～L−ℓ min. ℓ min. Refer to Step drawing	0.50	PC>A	Only Step D is designated. $C<\frac{P-A}{2}$ and ※ 0.1≦C≦4.0 ※When CVC code is used 0.10≦CVC≦1.00	Only Step E is designated. $R\leqq\frac{P-A}{2}$ and R≧0.2	(P−0.08)≦PC≦P When PC=P, designate PCX	0.3～10.0	2.0～50.0 F−(2+SV+N)≧10	Standard ℓ≦10XA and ℓ≦35 Precision ℓ≦12XA and ℓ≦35
				1.5		1.00～1.49	1.000～1.495									
4				2		1.50～1.99	1.500～1.995									
5				2.5		2.00～2.49	2.000～2.495									
6				3		2.50～2.99	2.500～2.995		0.70							
7				3.5	16.50～120.00	3.00～3.49	3.000～3.495		1.00					0.5～15.0	2.0～60.0 F−(2+SV+N)≧10	
				4		3.50～3.99	3.500～3.995									
8				4.5		4.00～4.49	4.000～4.495									
				5		4.50～4.99	4.500～4.995									
9				5.5		5.00～5.49	5.000～5.495		1.50							
				6		5.50～5.99	5.500～5.995		2.00							
10				7		6.00～6.99	6.000～6.995									
11				8		7.00～7.99	7.000～7.995									
15				10		8.00～9.99	8.000～9.995									
18				13		10.00～12.99	10.000～12.995									

Order

Part Number	L	P	F	A	C・R	Tip size (K・S・G・Q)	PC(PCX)	N	SV
GV−CPPBS−BS5	58.00	P4.95	F40.00	A4.80			PC4.890	N2	SV10
GV−CPVBS−DR6	46.00	P5.900	F38.00	A5.00	C0.3	Q1.0	PCX	N4	SV15

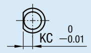
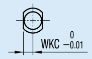
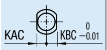
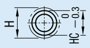
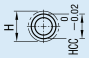
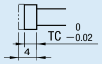
Days to Ship Quotation

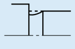
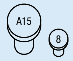
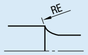
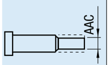
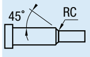
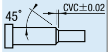
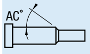
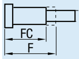
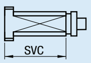
Price Quotation

Alterations

Part Number	L	P	F	A(AAC)	C(CVC)・R(RE)	Tip size (K・S・G・Q)	PC(PCX)	N	SV(SVC)	(KC・WKC···etc.)
GV−CPHBS−BC6	50.00	P5.90	F40.00	A5.00		G1.0	PCX	N4	SV10	HC8.0
GV−CPPBS−CS5	58.00	P4.90	F50.00	A4.80			PC4.69	N2	SV15	NHC−23

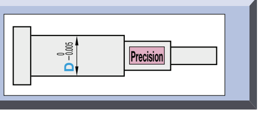
Alteration details P.495

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible Precision 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting P/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		Quotation
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3		
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L and F remain unchanged.) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 Available when H≧2	
	RE	R shape alteration (enlargement) RE=0.5mm increments 0.5≦RE≦2.0 F tolerance is $^{+0.05}_{0}$ Standard Available for Step E	
	AAC	Extends the working limit of A min. AAC=0.01mm increments ℓ≦10×AAC No. / A min. / AAC min.: 1～1.5 / 0.50 / 0.40; 3.5～4 / 1.00 / 0.70; 5.5 / 1.50 / 1.00; 6～13 / 2.00 / 1.50 In case of No.=2～3・4.5・5, A min. is the machining limit, and AAC cannot be used.	Quotation
	RC	Changes R (normally ≦0.1) to R≦0.05. Designation method RC Precision Available for Step B・C・D	
	CVC	C dimension can be designated at 0.01mm increments. 0.10≦CVC≦1.00 CVC=0.01mm increments Available for Step D	
	AC	Changes the standard angle (Ks=45°). AC=1° increments Available for Step C・D 30≦AC≦60 Combination with CVC/RC not available. When Step D, C≦1.0, A+2(C×tanAC°)<PC	
	FC	F dimension becomes shorter than F min., and L dimension becomes shorter than L min.,too. FC≧5mm It can be designated up to L min.=6.5mm. Available for Precision	
	SVC	Extend the flat section SV to the bottom. When P<1 ···› Available for L=60 or less When used concurrently with key flat cutting, SVC processing is done perpendicularly to the key flat surface.	

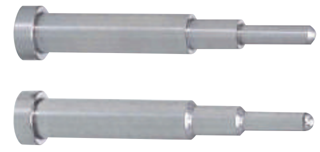
PRECISION TAPERLESS TWO-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (D) SELECTION TYPE—


D 0 −0.005
Precision

Non JIS material definition is listed on P.1351 - 1352

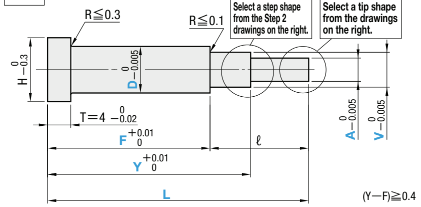
RoHS



Part Number				
Step1	**Material code**	**M H**	**Step2**	**Shape**
CB CC CD CE	SZ	SKD61 equivalent 48～52HRC	B C D E	S C G T R B
	SV	SKH51 equivalent 58～60HRC		

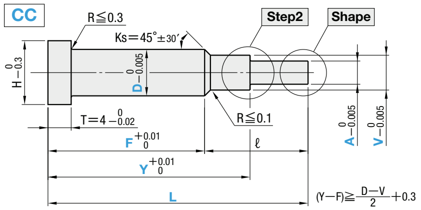
Step 1 (Type of the first step)

CB


Step2
Select a step shape from the Step 2 drawings on the right.
Shape
Select a tip shape from the drawings on the right.
R≦0.3
R≦0.1
H 0 −0.3
D 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
Y +0.01 0
L
A 0 −0.005
V 0 −0.005

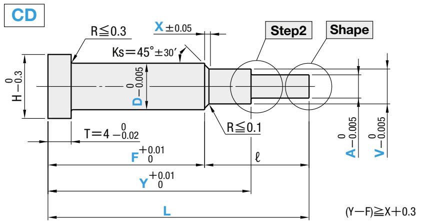
(Y—F)≧0.4

CC


R≦0.3
Ks=45°±30′
Step2
Shape
R≦0.1
H 0 −0.3
D 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
Y +0.01 0
L
A 0 −0.005
V 0 −0.005

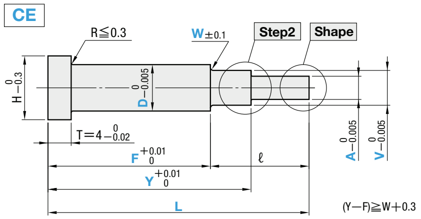
$(Y-F)\geqq\frac{D-V}{2}+0.3$

CD


R≦0.3
X±0.05
Ks=45°±30′
Step2
Shape
R≦0.1
H 0 −0.3
D 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
Y +0.01 0
L
A 0 −0.005
V 0 −0.005

(Y—F)≧X+0.3

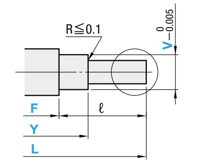
CE


R≦0.3
W±0.1
Step2
Shape
H 0 −0.3
D 0 −0.005
T=4 0 −0.02
F +0.01 0
ℓ
Y +0.01 0
L
A 0 −0.005
V 0 −0.005

(Y—F)≧W+0.3

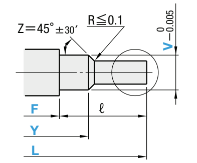
Step 2 (Type of the second step)

B


R≦0.1
V 0 −0.005
F
ℓ
Y
L

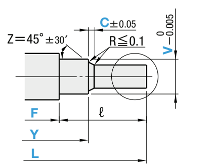
(L—Y)≧0.4+α

C


Z=45°±30′
R≦0.1
V 0 −0.005
F
ℓ
Y
L

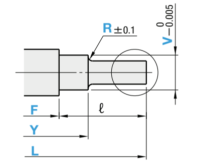
$(L-Y)\geqq\frac{V-A}{2}+0.3+\alpha$

D


Z=45°±30′
C±0.05
R≦0.1
V 0 −0.005
F
ℓ
Y
L

(L—Y)≧C+0.3+α

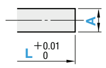
E


R±0.1
V 0 −0.005
F
ℓ
Y
L

(L—Y)≧R+0.3+α

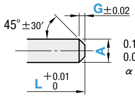
Shape (Tip type)

S (Not processed)



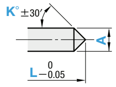
α=0

C (C chamfering)


45°±30′
G±0.02
A
L +0.01 0

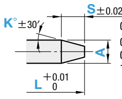
0.1≦G<A/2
0.05mm increments
α=G

G (Cone)



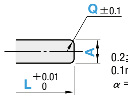
20<K≦60
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)


K°±30′
S±0.02
A
L +0.01 0

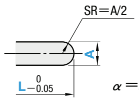
$0.1\leqq S<\frac{A}{2\tan K}$
0.05mm increments
0<K≦45
1° increments
α=S

R (R chamfering)



0.2≦Q<A/2
0.1mm increments
α=Q

B (Spherical processed)


SR=A/2
A
L 0 −0.05

α=A/2

Refer to the Shape drawing for L tolerance

H	Part Number					0.01mm increments							0.1mm increments				ℓ max.
						L		F	Y	V	A		X	W	C	R	
	Step1	Material	Step2	Shape	D	min.	max.				min.	max.					
3	CB CC CD CE	SZ SV	B C D E	S C G T R B	1	14.00	100.00	F≧12.00	Refer to the working limits shown in the drawing	D>V	0.50	V>A	Only Step1 CD is designated. 0.1≦X≦1.0 and $X<\frac{D-V}{2}$	Only Step1 CE is designated. W≧0.2 and $W\leqq\frac{D-V}{2}$	Only Step2 D is designated. $C<\frac{V-A}{2}$ and 0.1≦C≦1.0	Only Step2 E is designated. $R\leqq\frac{V-A}{2}$ and R≧0.2	ℓ≦10×A and ℓ≦35
					1.5												
4					2						0.70						
5					2.5												
6					3						1.00						
7					3.5		120.00										
					4												
8					4.5		120.00 Only for material SV 150.00				1.50						
					5												
9					5.5												
					6						2.00						
10					6.5												
					7												
11					8												
15					10												
18					13												
21					16												
25					20	30.00		F≧28.00			5.00						

Order

Part Number — L — F — Y — V — A — X・W — C・R — Tip size (K・S・G・Q)
CBSZBS 3.5 — 40.00 — F20.50 — Y31.00 — V2.80 — A2.50
CCSVCC 5 — 52.05 — F35.68 — Y44.00 — V3.85 — A3.35 — G0.5
CDSZDG 6 — 58.42 — F42.00 — Y49.00 — V4.30 — A2.00 — X0.5 — C0.5 — K30
CESVET 5.5 — 60.50 — F40.10 — Y51.00 — V4.60 — A3.30 — W0.2 — R0.3 — K30 — S1.0

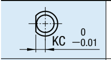
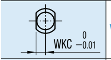
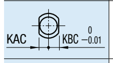
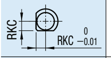
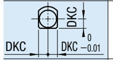
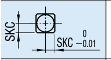
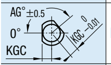
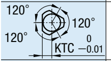
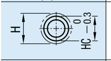
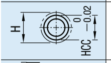
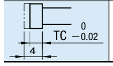
Days to Ship Quotation

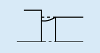
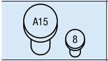
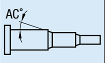
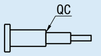
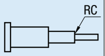
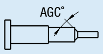
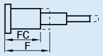
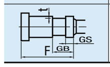
Price Quotation

Alterations

Part Number — L — F(FC) — Y — V — A — X・W — C・R — Tip size (K・S・G・Q) — (KC・WKC···etc.)
CBSVDS6 — 88.50 — F65.00 — Y80.00 — V4.50 — A3.50 — C0.3 — WKC3.0

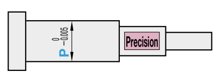
Alteration details P.495

Alterations	Code	Spec.	1Code
	KC	Single flat cutting D/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2	
	DKC	Three flats cutting D/2≦DKC<H/2	
	SKC	Four flats cutting D/2≦SKC<H/2	
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 0<AG<360 AG=1° increments	
	KTC	Three flats cutting at 120° D/2≦KTC<H/2	
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	Quotation
	NHC	Numbering on the head How to order P.496 ⊗ Combination with SKC not available. Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step1 CC・CD When Step1 CC, Y−F≧(D−V)/2tanAC° +0.3 When Step1 CD, V+2(X×tanAC°)<D	
	QC	Changes R (normally ≦0.1) to R≦0.05. Available for Step1 CB Designation method QC	
	RC	Changes R (normally ≦0.1) to R≦0.05. Available for Step2 B Designation method RC	
	AGC	Changes the standard angle (Z=45°). 30≦AGC≦60 Available for Step2 C・D When Step2 D, A+2(C×tanAGC°)<V	
	FC	F dimension becomes shorter than F min, and L dimension becomes shorter than L min. FC≧5mm It can be designated up to L min.=6.5mm	
	GVC	Gas vent machining GS・GB=1mm increments Available when D≧2 2≦GS≦10 GS+2≦GB≦30 F min.≦F−GB How to order P.496	

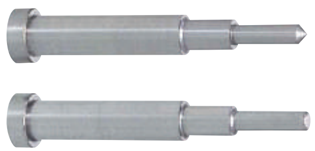
PRECISION TAPERLESS TWO-STEP CORE PINS (NO DRAFT ANGLE CORE PINS)

—SHAFT DIAMETER (P) 0.005mm DESIGNATION TYPE—


P $^{0}_{-0.005}$
Precision

Non JIS material definition is listed on P.1351 - 1352

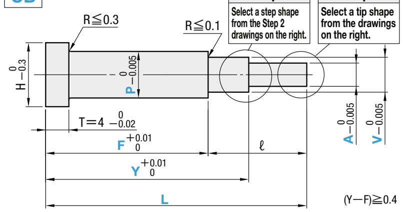
RoHS



Part Number				
Step1	Material code	M H	Step2	Shape
CB CC CD CE	SZB	SKD61 equivalent 48~52HRC	B C D E	S C G T R B
	SVB	SKH51 equivalent 58~60HRC		

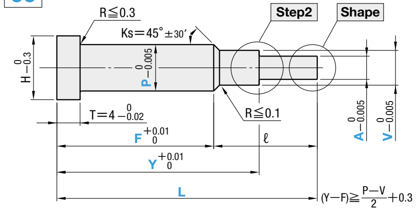
Step 1 (Type of the first step)

CB


Step2
Select a step shape from the Step 2 drawings on the right.
Shape
Select a tip shape from the drawings on the right.
R≦0.3
R≦0.1
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
Y $^{+0.01}_{0}$
L
ℓ
A $^{0}_{-0.005}$
V $^{0}_{-0.005}$

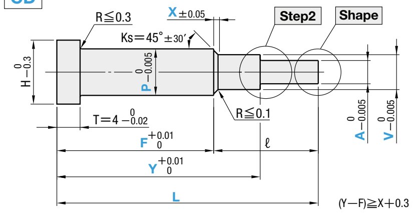
$(Y-F)\geqq 0.4$

CC


R≦0.3
Ks=45°±30′
Step2
Shape
R≦0.1
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
Y $^{+0.01}_{0}$
L
ℓ
A $^{0}_{-0.005}$
V $^{0}_{-0.005}$

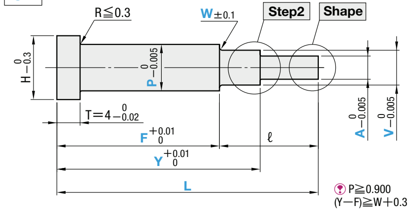
$(Y-F)\geqq \frac{P-V}{2}+0.3$

CD


R≦0.3
X±0.05
Ks=45°±30′
Step2
Shape
R≦0.1
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
Y $^{+0.01}_{0}$
L
ℓ
A $^{0}_{-0.005}$
V $^{0}_{-0.005}$

$(Y-F)\geqq X+0.3$

CE

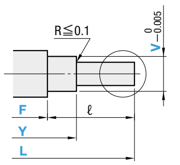

R≦0.3
W±0.1
Step2
Shape
H $^{0}_{-0.3}$
P $^{0}_{-0.005}$
T=4 $^{0}_{-0.02}$
F $^{+0.01}_{0}$
Y $^{+0.01}_{0}$
L
ℓ
A $^{0}_{-0.005}$
V $^{0}_{-0.005}$

$P\geqq 0.900$
$(Y-F)\geqq W+0.3$

Refer to the Shape drawing for L tolerance

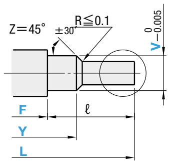
Step 2 (Type of the second step)

B


R≦0.1
V $^{0}_{-0.005}$
F
Y
L
ℓ

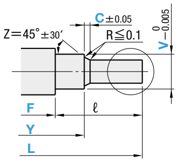
$(L-Y)\geqq 0.4+\alpha$

C


Z=45° ±30′
R≦0.1
V $^{0}_{-0.005}$
F
Y
L
ℓ

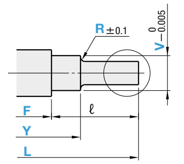
$(L-Y)\geqq \frac{V-A}{2}+0.3+\alpha$

D


Z=45°±30′
C±0.05
R≦0.1
V $^{0}_{-0.005}$
F
Y
L
ℓ

$(L-Y)\geqq C+0.3+\alpha$

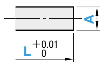
E


R±0.1
V $^{0}_{-0.005}$
F
Y
L
ℓ

$(L-Y)\geqq R+0.3+\alpha$

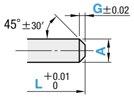
Shape (Tip type)

S (Not processed)



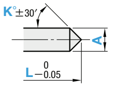
$\alpha=0$

C (C chamfering)


45°±30′
G±0.02
A
L $^{+0.01}_{0}$

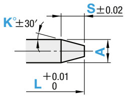
$0.1\leqq G<A/2$
0.05mm increments
$\alpha=G$

G (Cone)



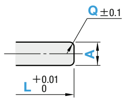
$20<K\leqq 60$
1° increments
$\alpha=\frac{A}{2\tan K}$

T (Tapered)


K°±30′
S±0.02
A
L $^{+0.01}_{0}$

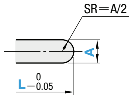
$0.1\leqq S<\frac{A}{2\tan K}$
0.05mm increments
$0<K\leqq 45$
1° increments
$\alpha=S$

R (R chamfering)



$0.2\leqq Q<A/2$
0.1mm increments
$\alpha=Q$

B (Spherical processed)


SR=A/2
A
L $^{0}_{-0.05}$

$\alpha=A/2$

H	Part Number					L (0.01mm increments)		P (0.005mm increments)	F (0.01mm increments)	Y (0.01mm increments)	V (0.01mm increments)	A (0.01mm increments)		X (0.1mm increments)	W (0.1mm increments)	C (0.1mm increments)	R (0.1mm increments)	ℓmax.
	Step1	Material	Step2	Shape	No.	min.	max.	min. P max.				min.	max.					
3	CB CC CD CE	SZB SVB	B C D E	S C G T R B	1.5	14.00	100.00	1.000~ 1.495	F≧12.00	Refer to the working limits shown in the drawing	P>V	0.50	V>A	Only Step1 CD is designated. 0.1≦X≦1.0 and $X<\frac{D-V}{2}$	Only Step1 CE is designated. W≧0.2 and $W\leqq\frac{D-V}{2}$	Only Step2 D is designated. $C<\frac{V-A}{2}$ and 0.1≦C≦1.0	Only Step2 E is designated. $R\leqq\frac{V-A}{2}$ and R≧0.2	ℓ≦10XA and ℓ≦35
4					2			1.500~ 1.995				0.70						
5					2.5			2.000~ 2.495										
6					3			2.500~ 2.995				1.00						
7					3.5		120.00	3.000~ 3.495										
					4			3.500~ 3.995										
8					4.5			4.000~ 4.495				1.50						
					5		120.00	4.500~ 4.995										
9					5.5			5.000~ 5.495										
					6			5.500~ 5.995				2.00						
10					6.5			6.000~ 6.495										
					7		Only for material SVB 150.00	6.500~ 6.995										
11					8			7.000~ 7.995										
15					10			8.000~ 9.995										
18					13			10.000~12.995										
21					16			13.000~15.995										
25					20	30.00		16.000~19.995	F≧28.00			5.00						

Order

Part Number	L	P	F	Y	V	A	X・W	C・R	Tip size (K・S・G・Q)
CBSZBBS 3.5	40.00	P3.310	F20.50	Y31.00	V2.80	A2.50			
CCSVBCC 5	52.05	P4.655	F35.68	Y44.00	V3.85	A3.35			G0.5
CDSZBDG 6	58.42	P5.885	F42.00	Y49.00	V4.30	A2.00	X0.5	C0.5	K30
CESVBET 5.5	60.50	P5.330	F40.10	Y51.00	V4.60	A3.30	W0.2	R0.3	K30—S1.0

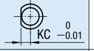
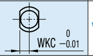
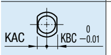
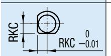
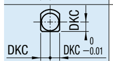
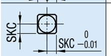
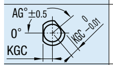
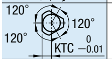
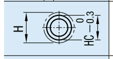
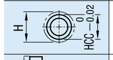
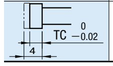
Days to Ship Quotation

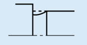
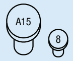
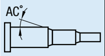
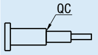
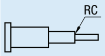
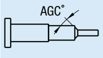
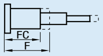
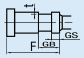
Price Quotation

Alterations

Part Number	L	P	F(FC)	Y	V	A	X・W	C・R	Tip size (K・S・G・Q)	(KC・WKC···etc.)
CBSVBDS6	88.50	P5.810	F65.00	Y80.00	V4.50	A3.50		C0.3		WKC3.0

Alteration details P.495

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting P/2≦WKC<H/2		
 KAC KBC $^{0}_{-0.01}$	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC $^{0}_{-0.01}$	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		
 DKC DKC DKC $^{0}_{-0.01}$	DKC	Three flats cutting P/2≦DKC<H/2		
 SKC SKC $^{0}_{-0.01}$	SKC	Four flats cutting P/2≦SKC<H/2		
 AG°±0.5 0° KGC KGC $^{0}_{-0.01}$	KGC	Two flats (angled) cutting P/2≦KGC<H/2 0<AG<360 AG=1° increments		
 120° 120° 120° KTC $^{0}_{-0.01}$	KTC	Three flats cutting at 120° P/2≦KTC<H/2		
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.		
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3		
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimensions L, Y, and F remain unchanged) 4−TC≦Lmax.−L		

Alterations	Code	Spec.	1Code
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 ⊗ Combination with SKC not available. Available when H≧2	
	AC	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for Step1 CC・CD When Step1 CC, Y−F≧(P−V)/2tanAC°+0.3 When Step1 CD, V+2(X×tanAC°)<P	
	QC	Changes R (normally ≦0.1) to R≦0.05. Available for Step1 CB Designation method QC	Quotation
	RC	Changes R (normally ≦0.1) to R≦0.05. Available for Step2 B Designation method RC	
	AGC	Changes the standard angle (Z=45°). 30≦AGC≦60 Available for Step2 C・D When Step2 D, A+2(C×tanAGC°)<V	
	FC	F dimension becomes shorter than F min, and L dimension becomes shorter than L min. FC≧5mm It can be designated up to L min.=6.5mm.	
	GVC	Gas vent machining GS・GB=1mm increments Available when P≧2.000 2≦GS≦10 GS+2≦GB≦30 F min. ≦F−GB How to order P.496	

ROUND CORE PINS FOR BOSS
SHAPED CORE PINS -ROUND SHANK TYPE-
ROUND CORE PINS -INLAY TYPE-

ROUND CORE PINS FOR BOSS

SHAPED CORE PINS
-ROUND SHANK TYPE-

ROUND CORE PINS
-INLAY TYPE-

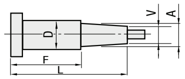
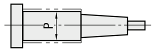
Product Name Part Number	Large-diameter Straight Core Pins—Shaft diameter (D) selection · Shaft diameter (P) designation— GCMN GCMK GCMX GCMBN GCMBK GCMBX	Round Shank Core Pins Shape B Shape C Shape D CPD—□□ CPP—□□ CPH—□□ CPV—□□	Round Core Pins for Boss—Shaft diameter (D) selection · Shaft diameter (P) designation— BC□S—□□ BC□BS—□□
Page	521	523	525

Round Core Pins for Boss—Gas release hole type— GV—BC□S—□□ GV—BC□BS—□□	Straight Core Sleeves -S dimension designation type- CS□K□4T CS□K□ CS□KB□4T CS□KB□	-S dimension selection type- CS□□4T CS□□ CS□B□4T CS□B□	Core Pins for Shaft Holes CPS□□ CPSB□□
527	529	531	533

Inlay Core Pins—Shaft diameter (D) selection type— CP□—2A CP□B—2A CP□—2B CP□B—2B CP□—2C	Inlay Core Pins—Shaft Diameter (P) Designation Type— CP□B—2C CP□—2D CP□B—2D CP□—2E CP□B—2E
535	537

Inlay Bushings—Head type— IRHB	—Straight type— IRB
539	540

Inlay Core Pins

Type	Group	T Shaft diameter (D or P)	T Tip part (A,V)	T Length (L,F)	M SKH51 equivalent	M SKD61 equivalent	Page
Shaft Diameter (D) Selection  	Precision	0 —0.005	±0.005	+0.01 0	CPV—2□	—	P.535
	Standard	0 —0.005	±0.01	+0.02 0	CPH—2□	CPP—2□	
		—0.01 —0.02	±0.015	+0.02 0	—	CPD—2□	
Shaft Diameter (P) Designation  	Precision	0 —0.005	±0.005	+0.01 0	CPVB—2□	—	P.537
	Standard	0 —0.005	±0.01	+0.02 0	CPHB—2□	CPPB—2□	
		—0.01 —0.02	±0.015	+0.02 0	—	CPDB—2□	

Tolerances of dimension F and A vary depending on the shape.

■Material Characteristics of Core Pins (Round, Round Shank, Inlay) and Core Sleeves.

Use these data for reference only as they are dependent on specific heat treatment and usage conditions.

M		SKH51 (M2) (1.3343) High speed tool steel	SKD61 (H13) (1.2344) Thermal die steel	NAK80 (P21 group) (Ni-Cr-Mo-Steel) Preciption type prehardend steel
H HRC		58～60	48～52	37～43
Machining characteristics	Abrasion resistance	5	3.5	2
	Ability to be mirror-finished	4	4	5
	Toughness	3	5	1
	Corrosion resistance	3	3	3
Physical characteristics	Watt density [g/cm³]	8.2	7.75	7.8
	Modulus of longitudinal elasticity [kg/mm²]	22300	21000	20500
	Coefficient of thermal expansion [$\times 10^{-6}$/℃]	10.1	10.8	12.5
	Thermal conductivity coefficient [cal/cm · sec · ℃]	0.0509	0.061	0.1
Mechanical characteristics	Tensile strength [kgf/mm²]	235	135	128
	Charpy impact values [kgf · m/cm²]	2	6	2.2

Machining characteristics Poor 1 ⟷ 5 Excellent

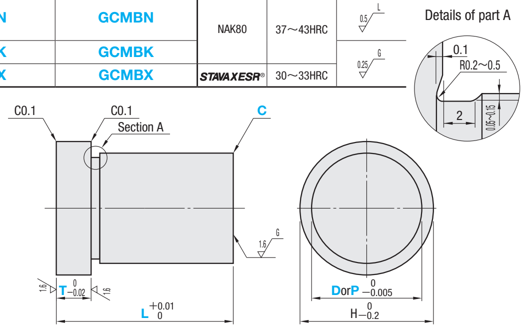
Conversion formula $1\text{kgf/mm}^2 = 9.81\text{N/mm}^2$
$1\text{cal/cm} \cdot \text{sec} \cdot ℃ = 418.6\text{W/M.K}$
$1\text{kgf} \cdot \text{m/cm}^2 = 9.81\text{J/cm}^2$

LARGE-DIAMETER STRAIGHT CORE PINS

Non JIS material definition is listed on P.1351 - 1352

RoHS

Part Number		M	H	D or P finishing
Shaft Diameter (D) Selection Type	Shaft diameter (P) designation type			
GCMN	**GCMBN**	NAK80	37～43HRC	0.5 L
GCMK	**GCMBK**			0.25 G
GCMX	**GCMBX**	***STAVAX ESR®***	30～33HRC	



■Shaft Diameter (D) Selection Type

H	Part Number		L	C	T
	Type	D	0.01mm increments	0.1mm increments	
15	**GCMN** **GCMK** (NAK80) **GCMX** (***STAVAX ESR®***)	10	20.00～100.00	0～0.5	4 6 8
19		14			
21		16			
25		20			
30		24			
35		30			
45		40			
55		50			
65		60			

STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	Part Number		0.01mm increments		C	T
	Type	No.	L	P	0.1mm increments	
15	**GCMBN** **GCMBK** (NAK80) **GCMBX** (***STAVAX ESR®***)	10	20.00～100.00	8.00～ 9.99	0～0.5	4 6 8
19		14		10.00～13.99		
21		16		14.00～15.99		
25		20		16.00～19.99		
30		24		20.00～23.99		
35		30		24.00～29.99		
45		40		30.00～39.99		
55		50		40.00～49.99		
65		60		50.00～59.99		

STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.

Order

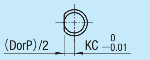
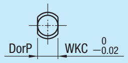
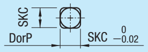
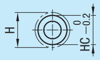
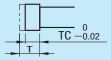
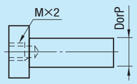
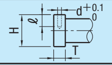
Part Number		L		P		C		T
GCMN 16	—	35.00			—	C0.1	—	T8
GCMBK20	—	50.02	—	P17.01	—	C0.3	—	T4

Days to Ship Quotation

Alterations

Part Number — L — P — C — T(TC) — (KC · WKC···etc.)

GCMBN14 — 60.30 — P10.20 — C0.2 — TC5 — KC — MC5

Alterations	Code	Spec.	1Code
 (DorP)/2 KC $^{0}_{-0.01}$	**KC**	Designate as KC when KC=(DorP)/2. ⊗ Dimension KC cannot be designated.	Quotation
 DorP WKC $^{0}_{-0.02}$	**WKC**	Designate as WKC when WKC=DorP. ⊗ Dimension WKC cannot be designated.	
 SKC DorP SKC $^{0}_{-0.02}$	**SKC**	Designate as SKC when SKC=DorP. ⊗ Dimension SKC cannot be designated.	
 H HC $^{0}_{-0.2}$	**HC**	Head diameter change HC=0.1mm increments (DorP)≦HC＜H	
 TC $^{0}_{-0.02}$ T	**TC**	Head thickness change TC=0.1mm increments, dimension L remains unchanged. 2.0≦TC＜8 or TC=0 (Note 1) T−TC≦Lmax.−L	
 M×2 DorP	**MC**	Head tapping When L≦M×4, the tapped hole may penetrate. Please be careful.	
 H ℓ d $^{+0.1}_{0}$ T	**NC**	Dowel hole boring ⊗ Combination with any other alteration not available.	

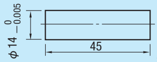
MC — Tap M selection:

D or P	Tap M selection
8.00～ 9.99	4
10.00～13.99	5
14.00～15.99	6 · 8
16.00～19.99	6 · 8 · 10
20.00～60.00	8 · 10 · 12 · 16

NC — Dowel hole:

T	d	ℓ
4	2	3
6 8	3	5

Note 1: Designating TC0 · DorP=HC results in a cylinder.
(Example) GCMN14—45—C0.1—TC0

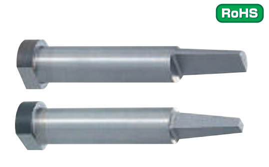


※There is no relief under the head.

Price Quotation

ROUND SHANK CORE PINS

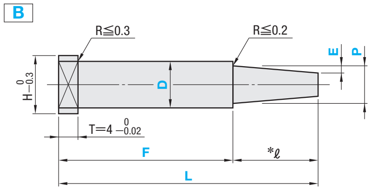
Non JIS material definition is listed on P.1351 - 1352



Part Number	M	H	Group	T D	T L・F	T P	T (P−2E) Tip	T W	T (W−2E) Tip
CPD−□□	SKD61 equivalent	48~52HRC	Standard	$^{-0.01}_{-0.02}$	$^{+0.05}_{0}$	±0.02	±0.02	±0.02	±0.02
CPP−□□				$^{0}_{-0.005}$	$^{+0.02}_{0}$	±0.01	±0.01	±0.01	±0.01
CPH−□□	SKH51 equivalent	58~60HRC		$^{0}_{-0.005}$	$^{+0.02}_{0}$	±0.01	±0.01	±0.01	±0.01
CPV−□□			Precision		$^{+0.01}_{0}$	±0.01 Shape H only ±0.005		±0.005	±0.005

Step

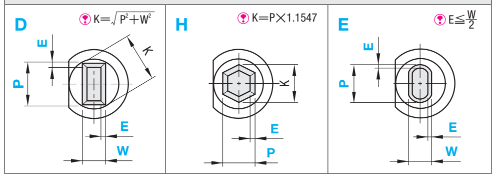
B



*

ℓmin.	ℓmax.	
	CPD−・CPH−	CPP−・CPV−
0.7	D2・2.5 ···› 8	
	0.6≦P・W<1.0 ···› 6	0.6≦P・W<2.5 ···› 6
	1.0≦P・W<1.3 ···› 8	2.5≦P・W<4.0 ···› 12
	1.3≦P・W<1.5 ···› 15	4.0≦P・W ···› 15
	1.5≦P・W ···› 20	

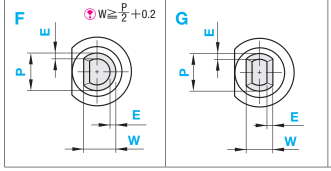
Shape



D: K=$\sqrt{P^2+W^2}$

H: K=P×1.1547

E: E≦$\frac{W}{2}$

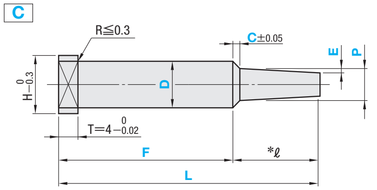


F: W≧$\frac{P}{2}$+0.2

P≧W

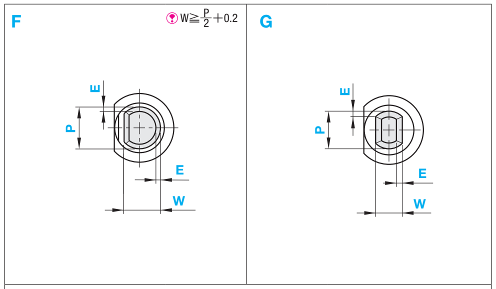
To position Core Pins to process, make a key flat cutting at the standard 0° .

C



*

ℓmin.	ℓmax.	
	CPD−・CPH−	CPP−・CPV−
C+0.5	D2・2.5 ···› 8	
	0.6≦P・W<1.0 ···› 6	0.6≦P・W<2.5 ···› 6
	1.0≦P・W<1.3 ···› 8	2.5≦P・W<4.0 ···› 12
	1.3≦P・W<1.5 ···› 15	4.0≦P・W ···› 15
	1.5≦P・W ···› 20	

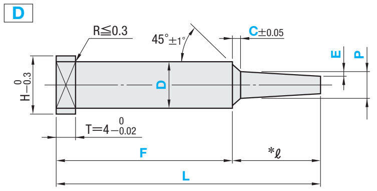


F: W≧$\frac{P}{2}$+0.2

P≧W

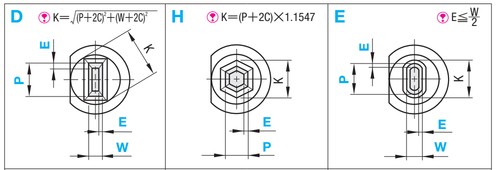
Key flat cut is added for positioning of machining to the core pins.

D



*

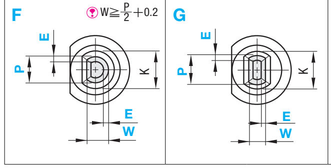
ℓmin.	ℓmax.	
	CPD−・CPH−	CPP−・CPV−
C+0.5	D2・2.5 ···› 8	
	0.6≦P・W<1.0 ···› 6	0.6≦P・W<2.5 ···› 6
	1.0≦P・W<1.3 ···› 8	2.5≦P・W<4.0 ···› 12
	1.3≦P・W<1.5 ···› 15	4.0≦P・W ···› 15
	1.5≦P・W ···› 20	



D: K=$\sqrt{(P+2C)^2+(W+2C)^2}$

H: K=(P+2C)×1.1547

E: E≦$\frac{W}{2}$



F: W≧$\frac{P}{2}$+0.2

P≧W

Key flat cut is added for positioning of machining to the core pins.

- **Shape** F・G

When C=$\frac{D-P}{2}$ Select Step C.

The tolerance of key flat cut part is D/2$^{0}_{-0.01}$.

H	Part Number				0.01mm increments						(P−2E) (W−2E) min.
	Type	Step	Shape	D	L	F	P・Kmax.	P・Wmin.	E	C	
4	CPD− CPP− (SKD61 equivalent) CPH− CPV− (SKH51 equivalent)	B C D	D H E F G	2	17.00 ~ 100.00	15.00 ~ 98.00	1.90	0.60	E≧0	0.30≦C≦0.50 and C≦$\frac{D-P}{2}$ Step No need to designate B.	0.50
5				2.5			2.40	0.80			0.60
6				3			2.90	1.00			
7				3.5			3.40				0.70
				4			3.90				
8				4.5			4.40				
				5			4.90	1.20			1.10
9				5.5			5.40				
				6			5.90				
10				6.5			6.40	1.50			1.40
				7			6.90				
11				8			7.90	1.60			1.50
15				10			9.90				

Step B*ℓ···ℓmin.0.7
ℓmax. Refer to the figure of the left page for details.

Step C・D*ℓ···ℓmin.=C+0.5
ℓmax. Refer to the figure of the left page for details.

Step C is available for Shape F and G only.

Order

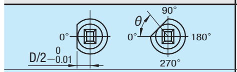
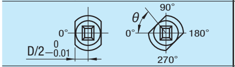
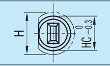
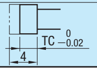
Part Number	—	L	—	F	—	P	—	W	—	E	—	C
CPD−CF5.5	—	38.00	—	F35.10	—	P3.45	—	W3.00	—	E0.05	—	C0.30

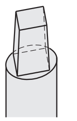
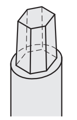
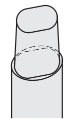
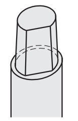
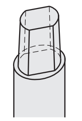
Days to Ship Quotation

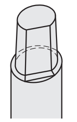
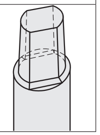
Price Quotation

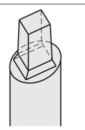
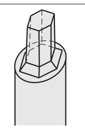
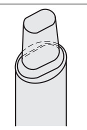
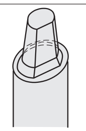
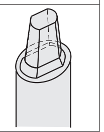
Alterations

Part Number	—	L	—	F	—	P	—	W	—	E	—	C	—	(AKC・AWC···etc.)
CPD−CF5.5	—	38.00	—	F35.10	—	P3.45	—	W3.00	—	E0.05	—	C0.30	—	TC3.0

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0<AKC<360 No need to designate AKC0 Designation method θ = 50° ···› AKC50	Quotation
	AWC	AWC=1° increments 0≦AWC<360 Designation method θ = 0° ···› AWC0 θ =60° ···› AWC60	
	HC	HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft. Designation method HC6.5	
	TC	TC=0.1mm increments 2.0≦TC<4 Dimensions L and F remain unchanged. 4−TC≦Lmax.−L Designation method TC3.5	

Step	B				
Shape	D	H	E	F	G
Three dimensional diagram					

Step	C	
Shape	F	G
Three dimensional diagram		

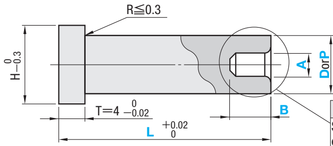
Step	D				
Shape	D	H	E	F	G
Three dimensional diagram					

ROUND CORE PINS FOR BOSS

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type		M	H	T		
Shaft diameter (D) selection type	Shaft diameter (P) designation type		HRC	DorP	A	B
BCDS−□□	BCDBS−□□	SKD61 equivalent	48〜52	−0.01 −0.02	0 −0.04	±0.02
BCPS−□□	BCPBS−□□			0 −0.005	0 −0.02	
BCHS−□□	BCHBS−□□	SKH51 equivalent	58〜60	0 −0.005	0 −0.02	
BCVS−□□	BCVBS−□□				0 −0.01	

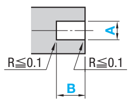


Shape
Select from the drawing below

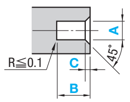
Concave part is applied with electric discharge finishing. ($\overset{0.4}{\nabla}$)

Shape

SS



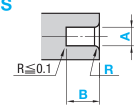
CS



0.2≦C≦0.5

C≦{(DorP)−A−0.2}/2

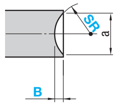
RS



0.3≦R≦0.5

R≦{(DorP)−A−0.2}/2

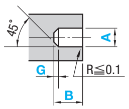
BL



0.8×(DorP)≦SR≦2×(DorP) B≦SR

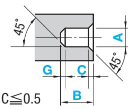
a≦(DorP)−0.4 a=$2\sqrt{SR^2-(SR-B)^2}$

SG



0.25≦G≦1.0 A≧2G+0.5

CG

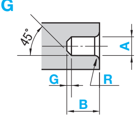


0.2≦C≦0.5

C≦{(DorP)−A−0.2}/2

0.25≦G≦1.0 A≧2G+0.5

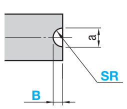
RG



0.3≦R≦0.5

0.25≦G≦1.0 A≧2G+0.5

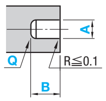
BS



0.5≦SR≦2×(DorP) B≦SR

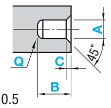
a≦(DorP)−1 a=$2\sqrt{SR^2-(SR-B)^2}$

SQ



0.25≦Q≦1.0 A≧2Q+0.5

CQ

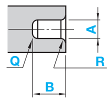


0.2≦C≦0.5

C≦{(DorP)−A−0.2}/2

0.25≦Q≦1.0 A≧2Q+0.5

RQ



0.3≦R≦0.5

0.25≦Q≦1.0 A≧2Q+0.5

■Unit of designation

T	Unit of designation
C±0.1	0.05mm increments
R±0.1	
G±0.1	
Q±0.1	
SR±0.1	0.01mm increments
B±0.02	

■Shaft Diameter (D) Selection Type

H	Part Number			0.01mm increments		
	Type	Shape	D	L	A	B
4	BCDS− BCPS− (SKD61 equivalent)	SS SG SQ CS CG CQ RS RG RQ	2	10.00 〜 100.00	1.0≦A≦D−1	0.50≦B≦3.00 and B≦2×A When Shape BL・BS are selected 0.30≦B≦3.00
5			2.5			
6			3			
7			3.5	10.00 〜 120.00		
			4			
8	BCHS− BCVS− (SKH51 equivalent)		4.5			
			5		1.0≦A≦D−1.5	
9			5.5			
			6			
10	BCDS− BCHS−	BL BS	6.5			
			7		1.0≦A≦D−2	
11			8			

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	Part Number			0.01mm increments			
	Type	Shape	No.	L	P	A	B
4	BCDBS− BCPBS− (SKD61 equivalent)	SS SG SQ CS CG CQ RS RG RQ	2*	10.00 〜 100.00	1.50〜1.99	1.0≦A≦P−1	0.50≦B≦3.00 and B≦2×A When Shape BL・BS are selected 0.30≦B≦3.00
5			2.5		2.00〜2.49		
6			3		2.50〜2.99		
7			3.5	10.00 〜 120.00	3.00〜3.49		
			4		3.50〜3.99		
8	BCHBS− BCVBS− (SKH51 equivalent)		4.5		4.00〜4.49		
			5		4.50〜4.99	1.0≦A≦P−1.5	
9			5.5		5.00〜5.49		
			6		5.50〜5.99		
10	BCDBS− BCHBS−	BL BS	6.5		6.00〜6.49		
			7		6.50〜6.99	1.0≦A≦P−2	
11			8		7.00〜7.99		

*No.2 ···› Applicable to Shape BL only.

Order

Part Number	—	L	—	P	—	A	—	B	—	C・R・SR・G・Q
(Shaft diameter (D) selection type) BCDS−CG4	—	38.00			—	A2.50	—	B2.50	—	C0.5 — G0.3
(Shaft diameter (P) designation type) BCHBS−BL3	—	50.00	—	P2.80			—	B0.40	—	SR2.00

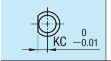
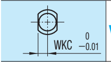
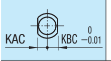
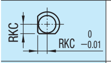
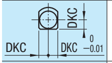
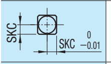
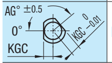
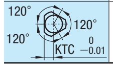
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	P	—	A	—	B	—	Tip size (C・R・SR・G・Q)	—	(KC・WKC···etc.)
BCDS−CG4	—	38.00			—	A3.00	—	B2.50	—	C0.3 — G0.3	—	RKC3.0
BCHBS−BL6	—	50.00	—	P5.70			—	B0.40	—	SR2.60	—	TRN

Alteration details P.495

Alterations	Code	Spec.	1Code
	KC	Single flat cutting (DorP)/2≦KC<H/2	
	WKC	Two flats cutting (DorP)/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting (DorP)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting (DorP)/2≦RKC<H/2	Quotation
	DKC	Three flats cutting (DorP)/2≦DKC<H/2	
	SKC	Four flats cutting (DorP)/2≦SKC<H/2	
	KGC	Two flats (angled) cutting (DorP)/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120 ° (DorP)/2≦KTC<H/2	

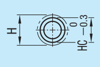
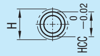
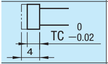
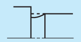
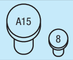
About Designation Unit for Key Flat Cutting

(1)To align the key flat with the shaft diameter

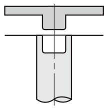
Unit of designation
- Shaft Diameter (D) Selection Type 0.05mm increments possible
- Shaft diameter (P) designation type 0.005mm increments possible

(2)To designate arbitrary key flat dimensions

Unit of designation 0.1mm

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (DorP)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (DorP)+0.5≦HCC<H−0.3	Quotation
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 ⊗ Combination with SKC not available. Available when H≧2.	

Note that finished products may not release if the core pin's A／B ratio, material, molding conditions, etc. are inappropriate.



ROUND CORE PINS FOR BOSS

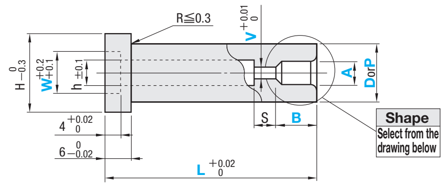
—GAS RELEASE HOLE TYPE—

Non JIS material definition is listed on P.1351 - 1352

Refer to "Core Sleeves" in P.529・P.531 for the shape of boss height 4mm or more.

RoHS

Type		M	H	T		
Shaft diameter (D) selection type	Shaft diameter (P) designation type		HRC	DorP	A	B
GV−BCHS−□□	GV−BCHBS−□□	SKH51 equivalent	~	−	−	±
GV−BCVS−□□	GV−BCVBS−□□				−	



■Counterbore Hole Diameters

W dimension is determined depending on V dimension.

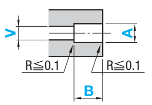
W	V
3	0.80~1.50
4	1.51~2.00
5	2.01~2.50
6	2.51~3.00
7	3.01~4.00

h=V+(0.2~0.4)

Concave part is applied with electric discharge finishing. (0.4)

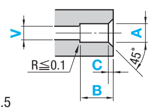
Shape

SS



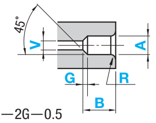
V≦A−0.5

CS



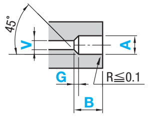
V≦A−0.5
0.2≦C≦0.5
C≦{(DorP)−A−0.2}/2

RG



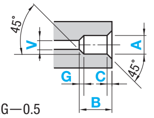
V≦A−2G−0.5
0.3≦R≦0.5
0.25≦G≦1.0　A≧2G+0.5

SG



V≦A−2G−0.5
0.25≦G≦1.0　A≧2G+0.5

CG



V≦A−2G−0.5
0.2≦C≦0.5　0.25≦G≦1.0
C≦{(DorP)−A−0.2}/2　A≧2G+0.5

■Unit of designation

T	Unit of designation
C±0.1	0.05mm increments
R±0.1	
G±0.1	
B±0.02	0.01mm increments

■Shaft Diameter (D) Selection Type

H	S	Part Number			0.01mm increments			
		Type	Shape	D	L	A	B	V
6	5	GV−BCHS− GV−BCVS−	SS SG CS CG RG	3	10.00~60.00	1.50≦A≦D−1	0.50≦B≦4.00 and B≦3×A	Shape SS・CS 0.80≦ V≦A−0.5 Shape SG・CG・RG 0.80≦ V≦A−2G−0.5
7				3.5				
				4				
8				4.5				
				5		1.50≦A≦D−1.5		
9				5.5				
				6				

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	S	Part Number			0.01mm increments				
		Type	Shape	No.	L	P	A	B	V
6	5	GV−BCHBS− GV−BCVBS−	SS SG CS CG RG	3*	10.00~60.00	2.50~2.99	1.50≦A≦P−1	0.50≦B≦4.00 and B≦3×A	Shape SS・CS 0.80≦ V≦A−0.5 Shape SG・CG・RG 0.80≦ V≦A−2G−0.5
7				3.5		3.00~3.49			
				4		3.50~3.99			
8				4.5		4.00~4.49			
				5		4.50~4.99	1.50≦A≦P−1.5		
9				5.5		5.00~5.49			
				6		5.50~5.99			

*No.3 is applicable only to Shape SS・CS.

Order

Part Number	L	P	A	B	V	C・R・G
(Shaft diameter (D) selection type) GV−BCVS− CG4	38.00		A2.50	B2.50	V1.50	C0.5−G0.25
(Shaft diameter (P) designation type) GV−BCHBS−SG3	50.00	P2.80	A1.80	B3.00	V0.80	G0.25

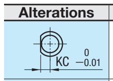
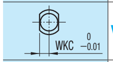
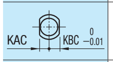
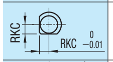
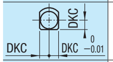
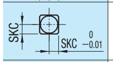
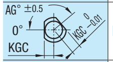
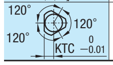
Days to Ship Quotation

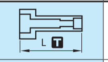
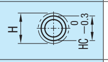
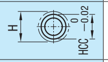
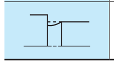
Price Quotation

Alterations

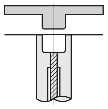
Part Number	L	P	A	B	V	Tip size (C・R・G)	(KC・WKC···etc.)
GV−BCVS− CG4	38.00		A3.00	B2.50	V1.50	C0.3 −G0.3	RKC3.0
GV−BCHBS−CG6	50.00	P5.70	A4.00	B3.00	V2.50	G0.5	TRN

Alteration details P.495

Alterations	Code	Spec.	1Code
	KC	Single flat cutting (DorP)/2≦KC<H/2 About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation ・Shaft diameter (D) selection type 0.05mm increments possible ・Shaft diameter (P) designation type 0.005mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting (DorP)/2≦WKC<H/2	
	KAC KBC	Varied width parallel flats cutting (DorP)/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2	
	RKC	Two flats (right angled) cutting (DorP)/2≦RKC<H/2	Quotation
	DKC	Three flats cutting (DorP)/2≦DKC<H/2	
	SKC	Four flats cutting (DorP)/2≦SKC<H/2	
	KGC	Two flats (angled) cutting (DorP)/2≦KGC<H/2 AG=1° increments 0<AG<360	
	KTC	Three flats cutting at 120° (DorP)/2≦KTC<H/2	

Alterations	Code	Spec.	1Code
	LKC	Changes L dimension tolerance $L^{+0.02}_{0} \cdots\rightarrow L^{+0.01}_{0}$	
	HC	Head diameter change HC=0.1mm increments (DorP)≦HC<H,W+1.2≦HC In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments (DorP)+0.5≦HCC<H−0.3	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	

Note that finished products may not release if the core pin's A／B ratio, material, molding conditions, etc. are inappropriate.



Characteristics

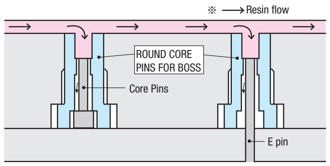
This core pin is appropriate for precisely processing the positioning boss of molding products.

The diameter tolerance of the boss is set to $^{\ 0}_{-0.02}$ ／ $^{\ 0}_{-0.01}$ and a minus side. Then the assembly of the molding product and the alignment adjustment can be simply done.

Short shot and gas bake in molding can be surely prevented, because gas relief hole is designed on the boss tip. Decreases the cavity filling pressure of resin.

* Due to the filling pressure decreasing, break and burr of pins and residual distortion of molding products are reduced.

Example



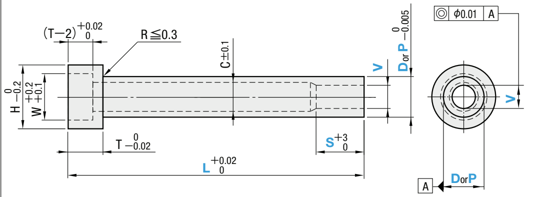
STRAIGHT CORE SLEEVES

—S DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

M	H HRC	Group	T D or P	T L	T V	Shaft diameter (D) selection type 4mm head	Shaft diameter (D) selection type 6mm head	Shaft diameter (P) designation type 4mm head	Shaft diameter (P) designation type 6mm head
SKH51 equivalent	58~60	Standard	0 −0.005	+0.02 0	+0.01 0	CSHK4T	CSHK	CSHKB4T	CSHKB
NAK80	37~43					CSGK4T	CSGK	CSGKB4T	CSGKB
SKH51 equivalent	58~60	Precision			+0.005 0	CSHKV4T	CSHKV	CSHKBV4T	CSHKBV
NAK80	37~43					CSGKV4T	CSGKV	CSGKBV4T	CSGKBV



■Counterbore Hole Diameters

W dimension is determined depending on V dimension.

W	V
3	0.80~1.50
4	1.51~2.00
5	2.01~2.50
6	2.51~3.00
7	3.01~4.00
8	4.01~5.00
9	5.01~6.00
10	6.01~7.00
11	7.01~7.50

■Shaft Diameter (D) Selection Type

H	C	Part Number Type 4mm head	Part Number Type 6mm head	D	0.01mm increments L	V Standard	V Precision	S 0.5mm increments	Smax.
8	C=V+(0.2~0.4)	Standard Type CSHK4T CSGK4T	Standard Type CSHK CSGK	4	15.00~ 60.00	0.80~2.50	0.60~2.90	In the case of Standard Type 1.0≦S≦(V×10)	30 and L−(T−2)
9				5		1.00~3.50	0.60~3.90		
10				6	15.00~100.00	1.00~4.50	0.60~4.90		
11		Precision Type(4≦D≦6) CSHKV4T CSGKV4T	Precision Type(4≦D≦6) CSHKV CSGKV	7	20.00~100.00	1.00~5.50	—	In the case of Precision Type 1.0≦S≦(V×3)	
12				8		2.00~6.50			
14				9	30.00~100.00	2.00~7.50			

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	C	Part Number Type 4mm head	Part Number Type 6mm head	No.	0.01mm increments L	V Standard	V Precision	P	S 0.5mm increments	Smax.
8	C=V+(0.2~0.4)	Standard Type CSHKB4T CSGKB4T	Standard Type CSHKB CSGKB	4	15.00~ 60.00	0.80~2.49	0.60~2.89	3.00~3.99	In the case of Standard Type 1.0≦S≦(V×10)	30 and L−(T−2)
9				5		1.00~3.49	0.60~3.89	4.00~4.99		
10				6	15.00~100.00	1.00~4.49	0.60~4.89	5.00~5.99		
11		Precision Type(4≦No.≦6) CSHKBV4T CSGKBV4T	Precision Type(4≦No.≦6) CSHKBV CSGKBV	7	20.00~100.00	1.00~5.49	—	6.00~6.99	In the case of Precision Type 1.0≦S≦(V×3)	
12				8		2.00~6.49		7.00~7.99		
14				9	30.00~100.00	2.00~7.49		8.00~8.99		

Precision Type ··· V≦P−1.1 Standard Type ··· V≦P−1.5

Order

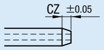
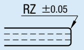
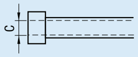
Part Number	L	V	P	S
CSGK 5	60.00	V1.50		S10.5
CSHK 6	60.00	V2.00		S20.0
CSHKB 6	60.00	V3.50	P5.49	S15.0

Days to Ship Quotation

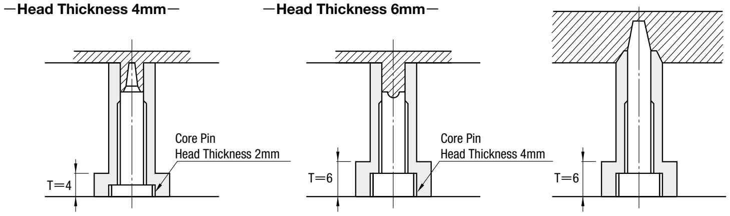
Price Quotation

Alterations

Part Number	L	V	P	S	(CZ · RZ · WN)
CSGK 5	60.00	V1.50		S10.5	WN
CSHK 6	60.00	V2.00		S20.0	CZ0.3
CSHKB 6	60.00	V3.50	P5.49	S15.0	RZ0.5

Alterations	Code	Spec.	1Code
 CZ ±0.05	CZ	Performs C chamfering on the tip. CZ=0.1mm increments $0.1 \leqq CZ \ \frac{(DorP)-V}{2}$ ⊗ Combination with RZ not available.	Quotation
 RZ ±0.05	RZ	Performs R chamfering on the tip. RZ=0.1mm increments $0.2 \leqq RZ \ \frac{(DorP)-V}{2}$ ⊗ Combination with CZ not available.	
 C	WN	No counterbore on the head	

Example



■Characteristics

Standard Type

①The fitting sections (S) can be long up to V×10.

②Precision wire cutting is used to make the S dimension longer.

③A softened layer in the bore made by wire cutting is removed by polishing.
(Tolerance of the dimension V is the value after polishing.)

Precision

In order to obtain the V dimension accuracy, inside surface grinding is applied.

Head Thickness 4 mm

A straight core sleeve 4-mm thick head type is a standard type that matches a core pin standard counterbore dimension of 4 mm.
It is possible to unify the counterbore of the head thickness to 4 mm.
For the core pin that is used set inside the core sleeves, either use alteration "Head thickness change (TC2)", or use a head thickness of 2 mm.

STRAIGHT CORE SLEEVES

—S DIMENSION FIXED TYPE—

Non JIS material definition is listed on P.1351 - 1352

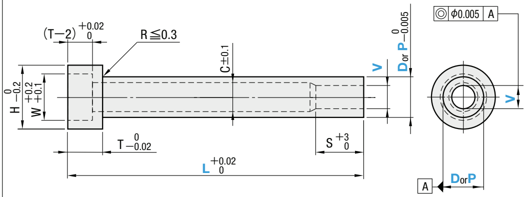
RoHS

M	H HRC	Group	T D or P	T L	T V	Type Shaft Diameter (D) Selection Type 4mm head	Type Shaft Diameter (D) Selection Type 6mm head	Type Shaft diameter (P) designation type 4mm head	Type Shaft diameter (P) designation type 6mm head
SKH51 equivalent	58～60	Standard	0 −0.005	+0.02 0	+0.01 0	CSHL4T	CSHL	CSHB4T	CSHB
NAK80	37～43					CSGL4T	CSGL	CSGB4T	CSGB
SKH51 equivalent	58～60	Precision			+0.005 0	CSV4T	CSV	CSVB4T	CSVB
NAK80	37～43					CSGLV4T	CSGLV	CSGBV4T	CSGBV

■Counterbore Hole Diameters

W dimension is determined depending on V dimension.

W	V
3	0.60～1.50
4	1.51～2.00
5	2.01～2.50
6	2.51～3.00
7	3.01～4.00
8	4.01～5.00
9	5.01～6.00
10	6.01～7.00
11	7.01～7.50



■Shaft Diameter (D) Selection Type

H	S	C	Part Number Type 4mm head	Part Number Type 6mm head	Part Number D	0.01mm increments L	0.01mm increments V Standard	0.01mm increments V Precision
7	Default S=(V×3) When L<V×3+(T−2) $S=\frac{L}{2}-(T-2)$	C=V+(0.2～0.4)	Standard Type CSHL4T CSGL4T Precision Type(3≦D≦6) CSV4T CSGLV4T	Standard Type CSHL CSGL Precision Type(3≦D≦6) CSV CSGLV	3	15.00～ 60.00	—	0.60～1.90
8					4	15.00～ 60.00	0.80～2.50	0.60～2.90
9					5		1.00～3.50	0.60～3.90
10					6	15.00～100.00	1.00～4.50	0.60～4.90
11					7	20.00～100.00	1.00～5.50	—
12					8		2.00～6.50	
14					9	30.00～100.00	2.00～7.50	

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	S	C	Part Number Type 4mm head	Part Number Type 6mm head	Part Number No.	0.01mm increments L	0.01mm increments V Standard	0.01mm increments V Precision	0.01mm increments P
7	Default S=(V×3) When L<V×3+(T−2) $S=\frac{L}{2}-(T-2)$	C=V+(0.2～0.4)	Standard Type CSHB4T CSGB4T Precision Type(3≦No.≦6) CSVB4T CSGBV4T	Standard Type CSHB CSGB Precision Type(3≦No.≦6) CSVB CSGBV	3	15.00～ 60.00	—	0.60～1.89	2.00～2.99
8					4	15.00～ 60.00	0.80～2.49	0.60～2.89	3.00～3.99
9					5		1.00～3.49	0.60～3.89	4.00～4.99
10					6	15.00～100.00	1.00～4.49	0.60～4.89	5.00～5.99
11					7	20.00～100.00	1.00～5.49	—	6.00～6.99
12					8		2.00～6.49		7.00～7.99
14					9	30.00～100.00	2.00～7.49		8.00～8.99

Precision Type ···› V≦P−1.1 Standard Type ···› V≦P−1.5

Order

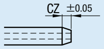
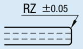
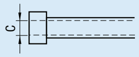
Part Number	—	L	—	V	—	P
CSHB5	—	60.00	—	V1.00	—	P4.00
CSV 5	—	60.00	—	V2.00		
CSVB5	—	60.00	—	V2.00	—	P4.99

Days to Ship Quotation

Price Quotation

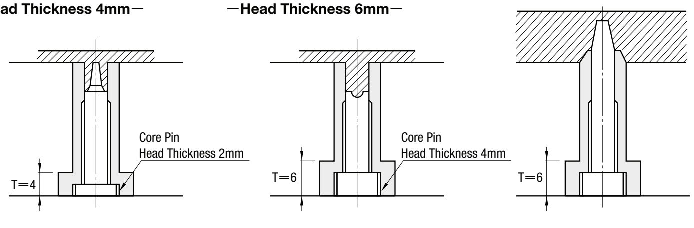
Alterations

Part Number	—	L	—	V	—	P	—	(CZ · RZ · WN)
CSHB5	—	60.00	—	V1.00	—	P4.00	—	WN
CSV 5	—	60.00	—	V2.00			—	CZ0.3
CSVB5	—	60.00	—	V2.00	—	P4.99	—	RZ0.5

Alterations	Code	Spec.	1Code
	CZ	Performs C chamfering on the tip. CZ=0.1mm increments 0.1≦CZ $\frac{(DorP)-V}{2}$ ⊗ Combination with RZ not available.	Quotation
	RZ	Performs R chamfering on the tip. RZ=0.1mm increments 0.2≦RZ $\frac{(DorP)-V}{2}$ ⊗ Combination with CZ not available.	
	WN	No counterbore on the head	

Example

—Head Thickness 4mm— —Head Thickness 6mm—



■Characteristics

Precision

In order to obtain the V dimension accuracy, inside surface grinding is applied.

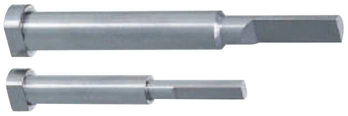
Head Thickness 4 mm

A straight core sleeve 4-mm thick head type is a standard type that matches a core pin standard counterbore dimension of 4 mm.
It is possible to unify the counterbore of the head thickness to 4 mm.
For the core pin that is used set inside the core sleeves, either use alteration "Head thickness change (TC2)", or use a head thickness of 2 mm.

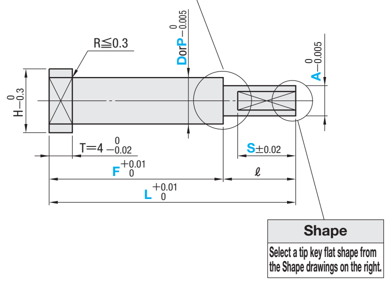
CORE PINS FOR SHAFT HOLES

Non JIS material definition is listed on P.1351 - 1352

RoHS



CPS□□
CPSB□□



Step
Select a step shape from the Step drawings on the right.

Shape
Select a tip key flat shape from the Shape drawings on the right.

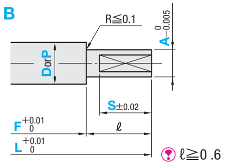
- ℓ≦10×A
- ℓ≦35

- The tolerance of key flat cut part is (DorP)/2 $^{0}_{-0.01}$
- Key flat cutting is performed for positioning shape process.

M	H
SKH51 equivalent	58～60HRC

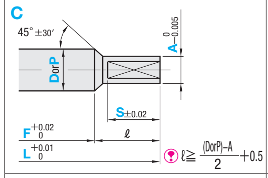
Step

B



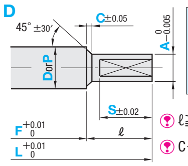
ℓ≧0 .6

C



$ℓ≧\frac{(DorP)-A}{2}+0.5$

D

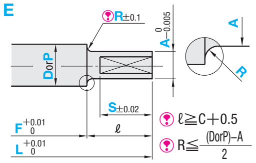


When $C=\frac{(DorP)-A}{2}$ select Step C

ℓ≧C+0.5

$C<\frac{(DorP)-A}{2}$

E

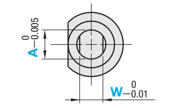


ℓ≧C+0.5

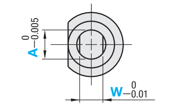
$R≦\frac{(DorP)-A}{2}$

Shape

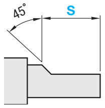
G (2 key flats)



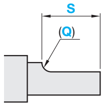
F (1 key flat)



Process A part on the C side. However, R can be designated too.



Default
The shape will be as shown in the drawing.



How to order
Designate as Q0.3 when R0.3.

■Shaft Diameter (D) Selection Type

H	Part Number				0.01mm increments					0.1mm increments	
	Type	Step	Shape	D	L	F	A	W	S	C・R	Q
4	CPS	B C D *E	G F	2	22.00 ～ 100.00	F≧20.00	D＞A≧1.50	$A＞W≧\frac{A}{2}$	S≧0.5 S≦ℓ	Step D $C<\frac{D-A}{2}$ and 0.1≦C≦1.0 Step E $R≦\frac{D-A}{2}$ and R≧0.3	Q≧0.3
5				2.5							
6				3							
7				3.5							
				4							
8				4.5							
				5	22.00 ～ 150.00						
9				5.5							
				6			D＞A≧2.00				
10				6.5							
				7							
11				8							
15				10							

*R designation is available for CPSE only. *CPSE is available when D≧2.5.

■Shaft Diameter (P) Designation (0.01mm increments) Type

H	Part Number				0.01mm increments						0.1mm increments	
	Type	Step	Shape	No.	L	P	F	A	W	S	C・R	Q
5	CPSB	B C D *E	G F	2.5	22.00 ～ 100.00	2.00～2.49	F≧20.00	P＞A≧1.50	$A＞W≧\frac{A}{2}$	S≧0.5 S≦ℓ	Step D $C<\frac{P-A}{2}$ and 0.1≦C≦1.0 Step E $R≦\frac{P-A}{2}$ and R≧0.3	Q≧0.3
6				3		2.50～2.99						
7				3.5		3.00～3.49						
				4		3.50～3.99						
8				4.5		4.00～4.49						
				5		4.50～4.99						
9				5.5	22.00 ～ 150.00	5.00～5.49						
				6		5.50～5.99						
10				6.5		6.00～6.49		P＞A≧2.00				
				7		6.50～6.99						
11				8		7.00～7.99						
15				10		8.00～9.99						

*R designation is available for CPSBE only. *CPSBE is available when P≧2.10.

Price Quotation

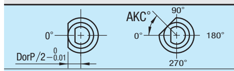
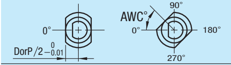
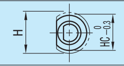
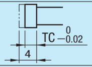
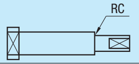
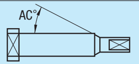
Order

Part Number	L	P	F	A	W	S	C・R(−Q)
CPSBG 2.5	78.00		F65.00	A2.10	W1.00	S13.00	
CPSBEG 3.5	78.00	P3.02	F65.00	A2.10	W1.10	S13.00	R0.3

Days to Ship Quotation

Alterations

Part Number	L	P	F	A	W	S	C・R(−Q)	(AKC・AWC…etc.)
CPSBG 2.5	78.00		F65.00	A1.50	W1.00	S13.00	Q0.3	TC3.0
CPSBBG 2.5	78.00	P2.36	F65.00	A1.50	W1.00	S13.00		TC3.0

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments 0＜AKC＜360 No need to designate AKC0 Designation method θ=50° ⋯AKC50	Quotation
	AWC	AWC=1° increments 0≦AWC＜360 Designation method θ= 0° ⋯AWC0 θ=60° ⋯AWC60	
	HC	HC=0.1mm increments DorP≦HC＜H Designation method HC6.5	
	TC	TC=0.1mm increments 1.5≦TC＜4.0 Dimensions L and F remain unchanged. Designation method TC3.5	
	RC	RC≦0.05 Changes R (normally≦0.1) to R≦0.05) Step Applicable to B Designation method RC	
	AC	AC=1° increments 30≦AC≦60 Step Applicable to C,D Working limit Step D: A+2(C×tanAC°)＜(DorP) Designation method AC33	

INLAY CORE PINS

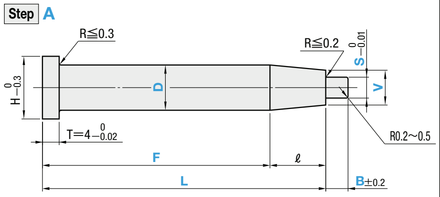
—SHAFT DIAMETER (D) SELECTION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

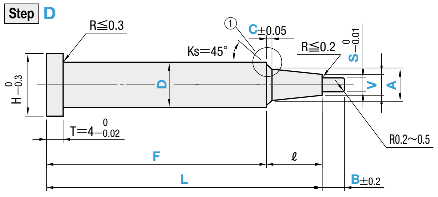
Type	M	H	Group	T D	T L	T F Step A	 Step B・C・D・E	T A Step B・C・D	 Step E	T V	T Ks Step C・D
CPD−2□	SKD61 equivalent	48~52HRC	Standard	−0.01 −0.02	+0.02 0	+0.05 0	+0.02 0	±0.015	±0.02	±0.015	45° ±1°
CPP−2□	SKD61 equivalent	48~52HRC		0 −0.005	+0.02 0	+0.05 0	+0.02 0	±0.01		±0.01	
CPH−2□	SKH51 equivalent	58~60HRC									
CPV−2□	SKH51 equivalent	58~60HRC	Precision		+0.01 0		+0.01 0	±0.005		±0.005	45° ±30'

Step A



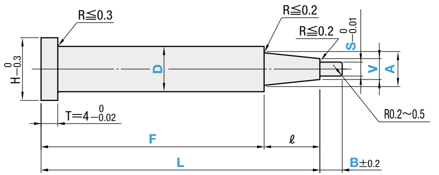
ℓ≧0.5

Step D



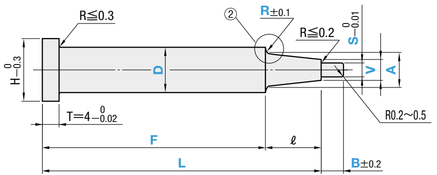
ℓ≧C+0.5

Step B



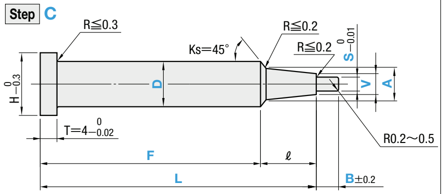
ℓ≧0.7

Step E



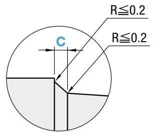
ℓ≧R+0.5

Step C

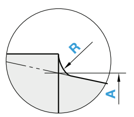


$\ell \geqq \frac{D-A}{2}+0.5$ When AC alteration is used. $\ell \geqq \frac{D-A}{2\tan AC}+0.5$

①Details of part



②Details of part



H	Part Number Type	 Step	 D	0.01mm increments L Standard	 Precision	 F	 A	 V	 S min.	0.1mm increments C・R	 B	ℓmax. Standard	 Precision
3	CPD−2 CPP−2 CPH−2 CPV−2	A B C D E	1.5	L≧12.00 and L≦100.00−B	L≧22.00 and L≦100.00−B	Standard F≧10.00 Precision F≧20.00	D>A≧V No need to designate A when Step A is selected.	A≧V>S	0.50	Step D only 0.1≦C≦4.0 and $C<\frac{D-A}{2}$ When, $C=\frac{D-A}{2}$ select Step C Step E only R≧0.2 and $R\leqq\frac{D-A}{2}$	0.7≦B≦5×S and B≦100−L	20.00	A×5 and 50.00
4			2						0.70			25.00	
5			2.5									30.00	
6			3						1.00			35.00	
7			3.5	L≧12.00 and L≦120.00−B	L≧22.00 and L≦120.00−B						0.7≦B≦5×S and B≦120−L	40.00	
			4									45.00	
8			4.5						1.50			50.00	
			5										
9			5.5										
			6						2.00				When Step A is selected D×5 and 50.00
10			6.5										
			7										
11			8										
15			10										
18			13						2.50				
21			16										
25			20	When D20 L≧30.00 and L≦120.00−B		When D20 F≧28.00			5.00				

Refer to the drawing for ℓ min.

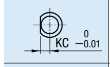
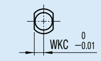
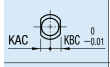
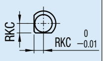
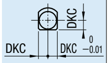
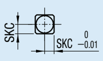
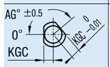
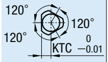
Order	Part Number	L	F	A	V	S	C・R	B
	CPD−2D6	64.00	F60.00	A3.80	V3.30	S2.00	C0.5	B3.0

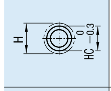
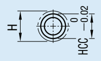
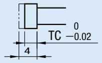
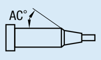
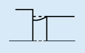
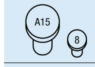
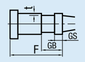
Days to Ship: Quotation

Price: Quotation

Alterations	Part Number	L	F	A	V	S	C・R	B	(KC・WKC…etc.)
	CPD−2C6	64.00	F60.00	A3.80	V3.30	S2.00		B3.0	WKC3.0

Alteration details P.495

Alterations	Code	Spec.		1Code
	KC	Single flat cutting D/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.05mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	Quotation
	WKC	Two flats cutting D/2≦WKC<H/2		
	KAC KBC	Varied width parallel flats cutting D/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
	RKC	Two flats (right angled) cutting D/2≦RKC<H/2		
	DKC	Three flats cutting D/2≦DKC<H/2		
	SKC	Four flats cutting D/2≦SKC<H/2		
	KGC	Two flats (angled) cutting D/2≦KGC<H/2 AG=1° increments 0<AG<360		
	KTC	Three flats cutting at 120 ° D/2≦KTC<H/2		

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	Quotation
	HCC	Head diameter change (precision) HCC=0.1mm increments D+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4(Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	
	AC	Changes the standard angle(Ks=45°) AC=1° increments 30≦AC≦60 Step Available for C・D Step When D, C≦1.0 and A+2(C×tanAC°)<D	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 ⊗ Combination with SKC not available. Available when H≧2	
	GVC	Gas vent machining GS・GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB Available when D≧2 How to order P.496	

INLAY CORE PINS

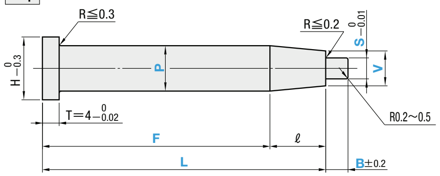
—SHAFT DIAMETER (P) DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

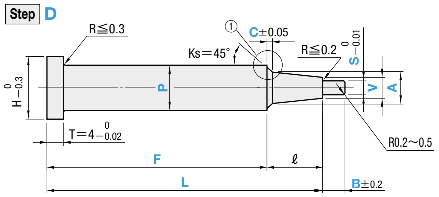
Type	M	H	Group	T P	T L	T F		T A		T V	T Ks
						Step A	Step B・C・D・E	Step B・C・D	Step E		Step C・D
CPDB−2□	SKD61 equivalent	48~52HRC	Standard	$^{-0.01}_{-0.02}$	$^{+0.02}_{0}$	$^{+0.05}_{0}$	$^{+0.02}_{0}$	±0.015	±0.02	±0.015	45° ±1°
CPPB−2□	SKD61 equivalent	48~52HRC		$^{0}_{-0.005}$	$^{+0.02}_{0}$	$^{+0.05}_{0}$	$^{+0.02}_{0}$	±0.01		±0.01	
CPHB−2□	SKH51 equivalent	58~60HRC									
CPVB−2□	SKH51 equivalent	58~60HRC	Precision		$^{+0.01}_{0}$		$^{+0.01}_{0}$	±0.005		±0.005	45° ±30'

Step A


R≦0.3
R≦0.2
S 0 −0.01
H 0 −0.3
P
V
T=4 0 −0.02
R0.2~0.5
F
ℓ
L
B±0.2

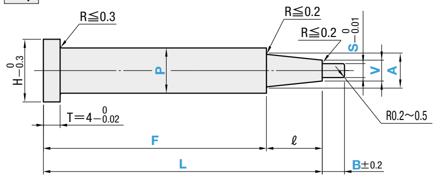
$\ell \geqq 0.5$

Step D


R≦0.3
①
C±0.05
Ks=45°
R≦0.2
S 0 −0.01
H 0 −0.3
P
V
A
T=4 0 −0.02
R0.2~0.5
F
ℓ
L
B±0.2

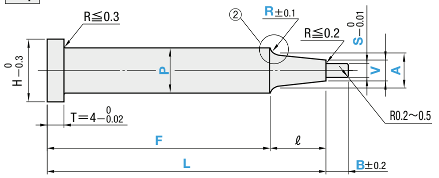
$\ell \geqq C+0.5$

Step B


R≦0.3
R≦0.2
R≦0.2
S 0 −0.01
H 0 −0.3
P
V
A
T=4 0 −0.02
R0.2~0.5
F
ℓ
L
B±0.2

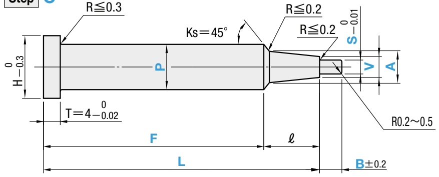
$\ell \geqq 0.7$

Step E


R≦0.3
②
R±0.1
R≦0.2
S 0 −0.01
H 0 −0.3
P
V
A
T=4 0 −0.02
R0.2~0.5
F
ℓ
L
B±0.2

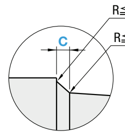
$\ell \geqq R+0.5$

Step C

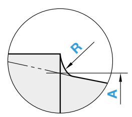

R≦0.3
Ks=45°
R≦0.2
R≦0.2
S 0 −0.01
H 0 −0.3
P
V
A
T=4 0 −0.02
R0.2~0.5
F
ℓ
L
B±0.2

$\ell \geqq \frac{P-A}{2}+0.5$ When AC alteration is used. $\ell \geqq \frac{P-A}{2\tan AC}+0.5$

①Details of part



②Details of part



H	Part Number			0.01mm increments (0.005mm increments for precision P dimension)							0.1mm increments		ℓmax.	
				L		P	F	A	V	S min.	C・R	B		
	Type	Step	No.	Standard	Precision								Standard	Precision
3	CPDB−2 CPPB−2 CPHB−2 CPVB−2	A B C D E	1.5	L≧12.00 and L≦100.00−B	L≧22.00 and L≦100.00−B	1.00~ 1.495	Standard F≧10.00 Precision F≧20.00 When P16.00~19.99 F≧28.00	P>A≧V No need to designate A when Step A is selected.	A≧V>S	0.50	Step D only 0.1≦C≦4.0 and $C<\frac{P-A}{2}$ When, $C=\frac{P-A}{2}$ select Step C Step E only R≧0.2 and $R\leqq\frac{P-A}{2}$	0.7≦B≦5×S and B≦100.00−L	20.00	A×5 and 50.00 When Step A P×5 and 50.00
4			2			1.50~ 1.995				0.70			25.00	
5			2.5			2.00~ 2.495							30.00	
6			3			2.50~ 2.995				1.00			35.00	
7			3.5	L≧12.00 and L≦120.00−B When P16.00~19.99 L≧30.00 and L≦120.00−B	L≧22.00 and L≦120.00−B	3.00~ 3.495						0.7≦B≦5×S and B≦120.00−L	40.00	
			4			3.50~ 3.995							45.00	
8			4.5			4.00~ 4.495				1.50			50.00	
			5			4.50~ 4.995								
9			5.5			5.00~ 5.495								
			6			5.50~ 5.995				2.00				
10			6.5			6.00~ 6.495								
			7			6.50~ 6.995								
11			8			7.00~ 7.995								
15			10			8.00~ 9.995								
18			13			10.00~12.995				2.50				
21			16			13.00~15.995								
25			20			16.00~19.995				5.00				

Refer to the drawing for ℓ min.

Order

Part Number	L	P	F	A	V	S	C・R	B
CPDB−2D5	35.00	P4.75	F23.00	A4.60	V4.00	S3.00	C0.5	B5.0

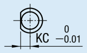
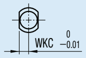
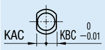
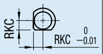
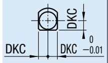
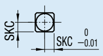
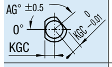
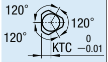
Days to Ship Quotation

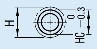
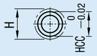
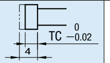
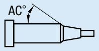
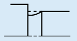
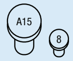
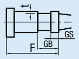
Price Quotation

Alterations

Part Number	L	P	F	A	V	S	C・R	B	(KC・WKC…etc.)
CPDB−2C5	35.00	P4.75	F23.00	A4.40	V4.00	S3.00		B5.0	RKC2.4

Alteration details P.495

Alterations	Code	Spec.		1Code
	KC	Single flat cutting P/2≦KC<H/2	About Designation Unit for Key Flat Cutting (1)To align the key flat with the shaft diameter Unit of designation 0.005mm increments possible Precision 0.0025mm increments possible (2)To designate arbitrary key flat dimensions Unit of designation 0.1mm	
	WKC	Two flats cutting P/2≦WKC<H/2		
 KAC KBC 0 −0.01	KAC KBC	Varied width parallel flats cutting P/2≦KAC<H/2 KBC=0.1mm increments only KAC<KBC<H/2		
 RKC RKC 0 −0.01	RKC	Two flats (right angled) cutting P/2≦RKC<H/2		Quotation
 DKC DKC DKC 0 −0.01	DKC	Three flats cutting P/2≦DKC<H/2		
 SKC SKC 0 −0.01	SKC	Four flats cutting P/2≦SKC<H/2		
 AG° ±0.5 0° KGC KGC 0 −0.01	KGC	Two flats (angled) cutting P/2≦KGC<H/2 AG=1° increments 0<AG<360		
 120° 120° 120° KTC 0 −0.01	KTC	Three flats cutting at 120 ° P/2≦KTC<H/2		

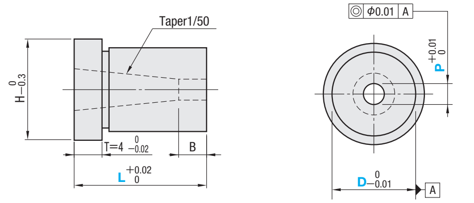
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments P+0.5≦HCC<H−0.3	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4(Dimensions L and F remain unchanged) 4−TC≦Lmax.−L	Quotation
	AC	Changes the standard angle(Ks=45°). AC=1° increments 30≦AC≦60 Step Available for C・D. Step When D, C≦1.0 A+2(C×tanAC°)<P.	
	TRN	Relief under the head (Makes plate chamfering unnecessary)	
	NHC	Numbering on the head How to order P.496 ⊗ Combination with SKC not available. Available when H≧2	
	GVC	Gas vent machining GS・GB=1mm increments 2≦GS≦10 GS+2≦GB≦30 Fmin.≦F−GB Available when P≧2.00 How to order P.496	

INLAY BUSHINGS

—HEAD TYPE—

RoHS

IRHB



Taper1/50
H $^{0}_{-0.3}$
T=4 $^{0}_{-0.02}$
B
L $^{+0.02}_{0}$
◎ Φ0.01 A
P $^{+0.01}_{0}$
D $^{0}_{-0.01}$
A

M SKH51 equivalent
H 58～60HRC

B	H	Part Number		0.01mm increments		U/Price
		Type	D	L	P	1～4 pcs.
3	5	IRHB	4	10.00～20.00	0.50～2.00	Quotation
	6		5		1.50～2.50	
4	9		6	10.00～25.00	2.00～3.00	
	11		8	15.00～25.00	2.50～4.00	
6	13		10	15.00～30.00	3.00～6.00	
10	15		12		3.50～8.00	

Order

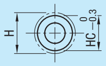
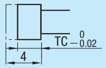
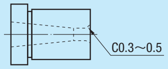
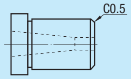
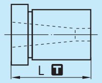
Part Number	—	L	—	P
IRHB10	—	24.68	—	P5.26

P Price Quotation

Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	(HC · TC · CC · CZ · LKC)
IRHB10	—	30.00	—	P3.00	—	HC12.5

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments D≦HC<H	Quotation
	TC	Head thickness change TC=0.1mm increments 2.0≦TC<4 (Dimensions L remains unchanged.) 4−TC≦Lmax.−L	
	CC	Performs C chamfering on the inlay hole(P)edge.	
	CZ	Adds a C chamfering on the tip outer part.	
	LKC	Changes L dimension tolerance. L $^{+0.02}_{0}$ ···› L $^{+0.01}_{0}$	

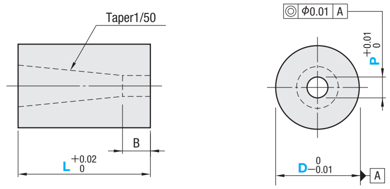
H
HC $^{0}_{-0.3}$
TC $^{0}_{-0.02}$
4
C0.3～0.5
C0.5
L T

INLAY BUSHINGS

—STRAIGHT TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS



Taper1/50
B
L $^{+0.02}_{0}$
◎ Φ0.01 A
P $^{+0.01}_{0}$
D $^{0}_{-0.01}$
A

M SKH51 equivalent
H 58～60HRC

B	Part Number		0.01mm increments		U/Price
	Type	D	L	P	1～4 pcs.
3	IRB	4	8.00～20.00	0.50～2.00	Quotation
		5		1.50～2.50	
4		6	10.00～25.00	2.00～3.00	
		8	15.00～25.00	2.50～4.00	
6		10	15.00～30.00	3.00～6.00	

Order

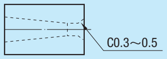
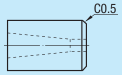
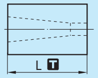
Part Number	—	L	—	P
IRB6	—	15.71	—	P2.48

P Price Quotation

Days to Ship Quotation

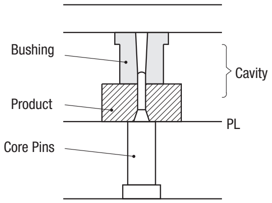
Alterations

Part Number	—	L	—	P	—	(CC · CZ · LKC)
IRB10	—	30.00	—	P3.00	—	CC

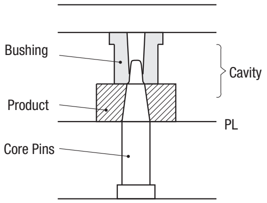
Alterations	Code	Spec.	1Code
	CC	Performs C chamfering on the inlay hole(P)edge.	Quotation
	CZ	Adds a C chamfering on the tip outer part.	
	LKC	Changes L dimension tolerance. L $^{+0.02}_{0}$ ···› L $^{+0.01}_{0}$	

C0.3～0.5
C0.5
L T

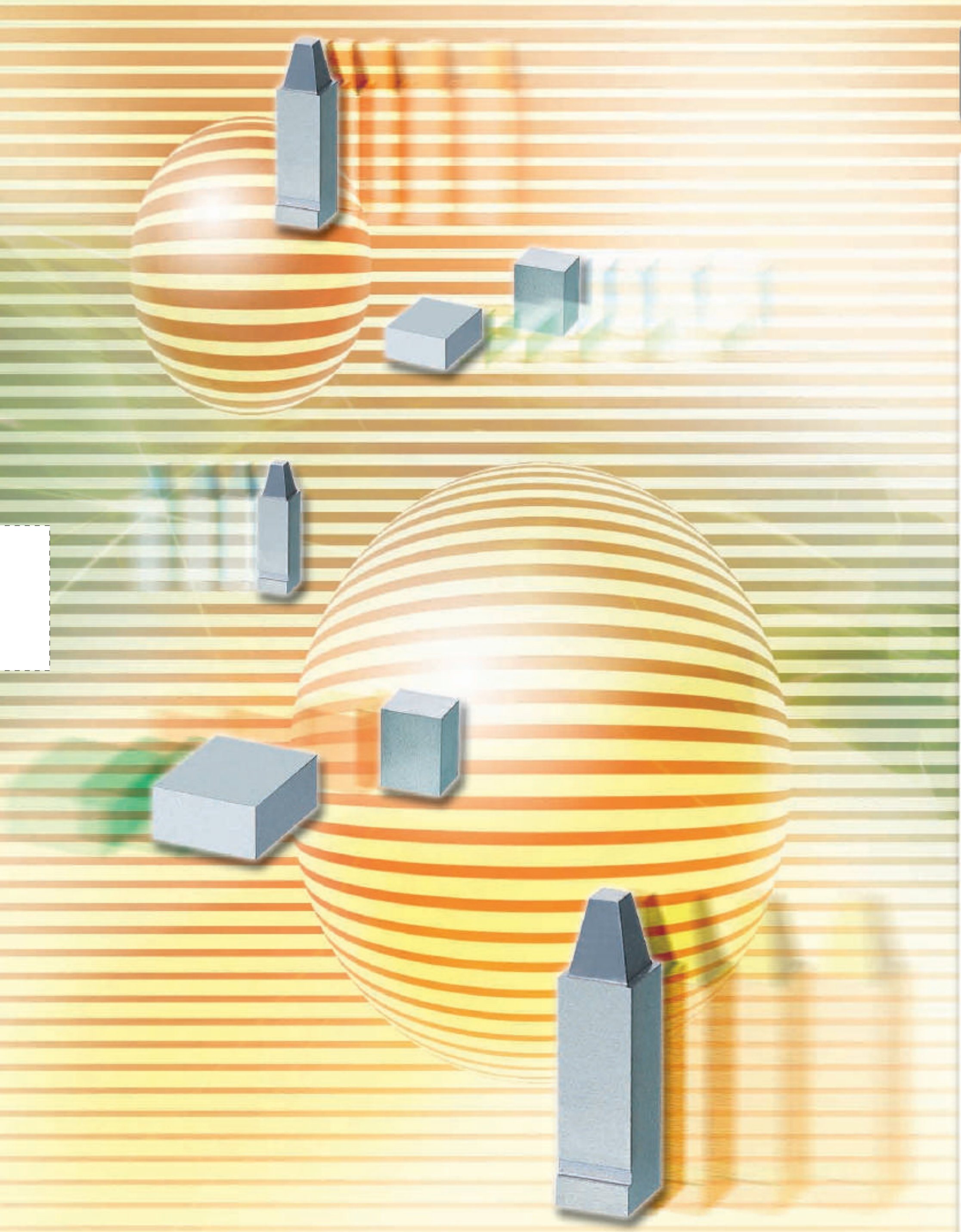
Example



Bushing
Cavity
Product
PL
Core Pins



Bushing
Cavity
Product
PL
Core Pins

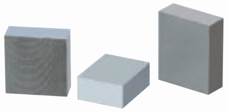
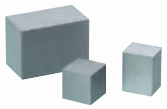


BLOCK CORE PINS · CAVITY INSERTS

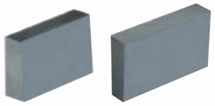
BLOCK CORE PINS CAVITY INSERTS

Product Name	Block Core Pins—Straight type—			—Flange type—		R-chamfered Block Core Pins—Straight type—		—Flange type—
Part Number	SPHD	BCSS□	BCSSX	BCS□	BCSX	SPHD—□□R	BCSSN—□□R	BCSH—□□RBCSN—□□R
Page	543	543	543	543	543	544		544

Block Core Pins with Tip Process		Block Core Pins With Engraving		Block Core Pins—Wide type—		Hardened Plates for Core—Top & Bottom 2-faces grinded type—		
BCS□□A	BCS□□B	BCSH	BCSN	BCSW□	BCSWS	HPSHW	HPHEW	HPSWW
545		547		549	549	550		

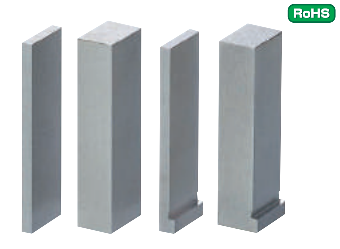



—6-faces grinded type—		Cavity Insert Block Blanks		Cavity Insert Blocks (6 faces grinded)	
HPS□	HP□E	No reference plane type	Reference plane type (4 faces grinded)	Standard	Precision
551		553	553	555	555

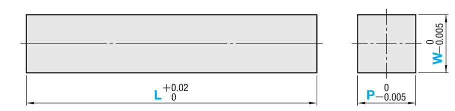


Cavity Insert Wedges—Tapered type—		—Bolt hole position free type—		Cavity Insert Wedge Spacers				Cavity Insert Wedges—Parallel type—
ICS	ICH	ICSM	ICHM	ICSS	ICHS	IUSS	IUHS	IPS
557	557	559	559	561	561	561	561	563

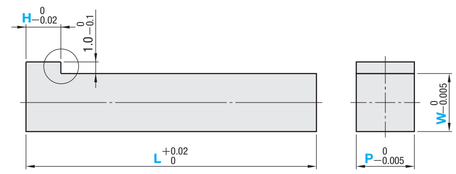
BLOCK CORE PINS
—STRAIGHT TYPE／FLANGE TYPE—

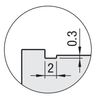


—STRAIGHT TYPE— SPHD・BCSS□


L +0.02 0
P 0 −0.005
W 0 −0.005

—FLANGE TYPE— BCS□


H 0 −0.02
1.0 0 −0.1
L +0.02 0
P 0 −0.005
W 0 −0.005



Relief on the flange

T P・W tolerance $_{-0.005}^{0}$

Part Number		M	H
Straight type	Flange type		
SPHD	BCSH	SKH51	61～64HRC
BCSSX	BCSX	*STAVAX ESR*®	27～35HRC
BCSSR	BCSR	*RIGOR*®	53～55HRC
BCSSV	BCSV	*ORVAR*® *SUPREME*	47～49HRC
BCSSA	BCSA		51～53HRC
BCSSN	BCSN	NAK80	37～43HRC
BCSSD	BCSD	DH2F	38～42HRC

STAVAX ESR®, *ORVAR*® *SUPREME* and *RIGOR*® are registered trademarks of UDDEHOLM TOOL CO.

■Straight type

Part Number Type	0.01mm increments L	P	W
SPHD (SKH51) BCSSX (*STAVAX ESR*®) BCSSR (*RIGOR*®) BCSSV (*ORVAR*® *SUPREME*) BCSSA BCSSN (NAK80) BCSSD (DH2F)	10.00 ～ *70.00 (100.00)	1.00～ 1.99	1.00～10.00
		2.00～10.00	1.00～20.00
		10.01～20.00	2.00～20.00

*P＜2.00 ···› L≦50.00 W＜2.00 ···› L≦50.00
BCSSR: W≦3.49 ···› L≦50.00
SPHD・BCSSN (L70.01～100.00), BCSSX ···› P・W≧5.01
BCSSD ···› P・W≧2.00
The figures in parentheses ( ) for L dimensions are applicable for SPHD・BCSSX・BCSSN only.

■Flange type

Part Number Type	0.01mm increments L	P	W	H
BCSH (SKH51) BCSX (*STAVAX ESR*®) BCSR (*RIGOR*®) BCSV (*ORVAR*® *SUPREME*) BCSA BCSN (NAK80) BCSD (DH2F)	10.00 ～ *70.00 (100.00)	1.00～ 1.99	1.00～10.00	4 6
		2.00～10.00	1.00～20.00	
		10.01～20.00	2.00～20.00	

*P＜2.00 ···› L≦50.00 W＜2.00 ···› L≦50.00
BCSR: W≦3.49 ···› L≦50.00
BCSH・BCSN (L70.01～100.00), BCSX ···› P・W≧5.01
BCSD ···› P・W≧2.00
The figures in parentheses ( ) for L dimensions are applicable for BCSH・BCSX・BCSN only.

Order

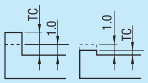
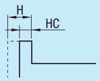
Part Number	L	P	W	H (BCS□ only)
BCSR	20.00	P3.20	W3.00	H6

Price Quotation

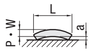
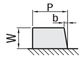
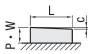
Days to Ship Quotation

Alterations

Part Number	L	P	W	R	H(HC)	(TC)
BCSR	20.00	P3.20	W3.00		HC5	TC0.5

Alterations	Code	Spec.	1Code
	TC	Changes the flange width (0.3≦TC≦3.0) BCSX only(0.3≦TC≦1.0) TC=0.1mm increments L10.00 30.00 ···› 0.3≦TC≦1.5 L30.01～50.00 ···› 0.3≦TC≦2.5 L50.01～70.00 ···› 0.3≦TC≦3.0	Quotation
	HC	Changes the flange thickness HC=0.1mm increments 2≦HC＜H Dimension L remains unchanged.	

■Precision Standard

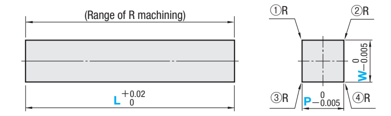
Precision Standard		Material SKH51 equivalent	Others
Warpage		a≦0.01	P・W＜2 ···› a≦0.05 P・W≧2 ···› a≦0.01
Squareness		b≦0.01	
Parallelism		P・W≦10 ···› C≦0.005 P・W＞10 ···› C≦0.01	

R-CHAMFERED BLOCK CORE PINS
—STRAIGHT TYPE／FLANGE TYPE—

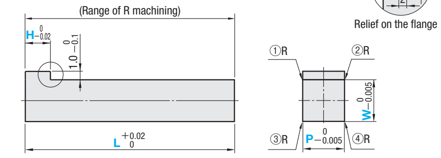
Non JIS material definition is listed on P.1351 - 1352

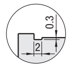
Shape	M (H)	Part Number One place of R	Two places of R	Three places of R	Four places of R
Straight	SKH51 (61～64HRC)	SPHD—1AR	SPHD—2AR SPHD—2BR SPHD—2CR	SPHD—3AR	SPHD—4R
	NAK80 (37～43HRC)	BCSSN—1AR	BCSSN—2AR BCSSN—2BR BCSSN—2CR	BCSSN—3AR	BCSSN—4R
With flange	SKH51 (61～64HRC)	BCSH—1AR BCSH—1BR	BCSH—2AR BCSH—2BR BCSH—2CR BCSH—2DR	BCSH—3AR BCSH—3BR	BCSH—4R
	NAK80 (37～43HRC)	BCSN—1AR BCSN—1BR	BCSN—2AR BCSN—2BR BCSN—2CR BCSN—2DR	BCSN—3AR BCSN—3BR	BCSN—4R

—Straight type—
SPHD —□□□
BCSSN—□□□


(Range of R machining)
L +0.02 0
①R
②R
③R
④R
P 0 −0.005
W 0 −0.005

—Flange type—
BCSH—□□□
BCSN—□□□

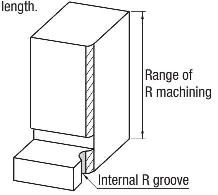

(Range of R machining)
H 0 −0.02
1.0 0 −0.1
L +0.02 0
①R
②R
③R
④R
P 0 −0.005
W 0 −0.005

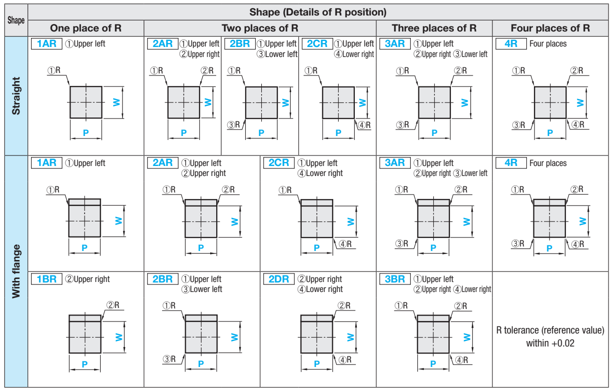


Relief on the flange

No. of R machining	Shape	R position ①Upper left	②Upper right	③Lower left	④Lower right
One place	1AR	①	—	—	—
	1BR	—	②	—	—
Two places	2AR	①	②	—	—
	2BR	①	—	③	—
	2CR	①	—	—	④
	2DR	—	②	—	④
Three places	3AR	①	②	③	—
	3BR	①	②	—	④
Four places	4R	①	②	③	④

Side of flange has R-groove since R-chamfering is processed to overall length.


Range of R machining
Internal R groove


Shape (Details of R position)
Shape
One place of R
Two places of R
Three places of R
Four places of R
Straight
With flange
1AR ①Upper left
2AR ①Upper left ②Upper right
2BR ①Upper left ③Lower left
2CR ①Upper left ④Lower right
3AR ①Upper left ②Upper right ③Lower left
4R Four places
1AR ①Upper left
2AR ①Upper left ②Upper right
2CR ①Upper left ④Lower right
3AR ①Upper left ②Upper right ③Lower left
4R Four places
1BR ②Upper right
2BR ①Upper left ③Lower left
2DR ②Upper right ④Lower right
3BR ①Upper left ②Upper right ④Lower right
R tolerance (reference value) within +0.02
P
W

■Straight type

Part Number Type	Shape	0.01mm increments L	P	W	R
SPHD— (SKH51) BCSSN— (NAK80)	1AR 2AR 2BR 2CR 3AR 4R	10.00～ *70.00	1.00～ 1.99	1.00～10.00	0.1 0.15 0.2
			2.00～10.00	1.00～20.00	
			10.01～20.00	2.00～20.00	

* P＜2.00 ···› L≦50.00 W＜2.00 ···› L≦50.00

■Flange type

Part Number Type	Shape	0.01mm increments L	P	W	R	H
BCSH— (SKH51) BCSN— (NAK80)	1AR 1BR 2AR 2BR 2CR 2DR 3AR 3BR 4R	10.00～ *70.00	1.00～ 1.99	1.00～10.00	0.1 0.15 0.2	4 6
			2.00～10.00	1.00～20.00		
			10.01～20.00	2.00～20.00		

* P＜2.00 ···› L≦50.00 W＜2.00 ···› L≦50.00

Order

Part Number Type	Shape	L	P	W	R	H (BCSH BCSN)
BCSH	1AR	20.00	P3.20	W3.00	R0.2	H6

■Precision Standard : Refer to the left page

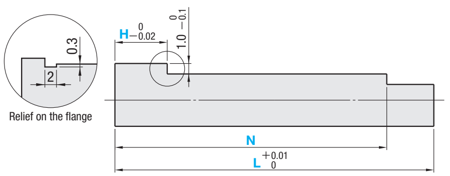
Days to Ship Quotation

Price Quotation

Alterations Left page

BLOCK CORE PINS WITH TIP PROCESS

RoHS

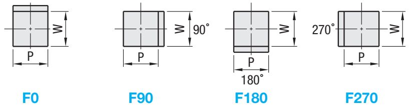

0.3
2
Relief on the flange
H −0.02 0
1.0 −0.1 0
N
L +0.01 0

Type	M	H	T J・E・A・V
BCSH	SKH51	61～64HRC	±0.005
BCSR	*RIGOR®*	53～55HRC	
BCSV	*ORVAR® SUPREME*	47～49HRC	
BCSA		51～53HRC	
BCSN	NAK80	37～43HRC	±0.01

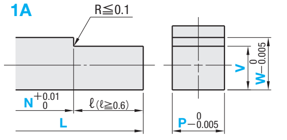
ORVAR®SUPREME and *RIGOR®* are registered trademarks of UDDEHOLM TOOL CO.

Precision Standard for Block Core Pins P.597

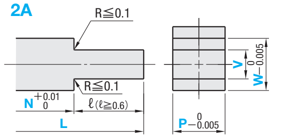
■Flange Position


0°
W
P
F0
0°
W
90°
P
F90
0°
W
P
180°
F180
0°
270°
W
P
F270

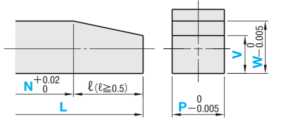
1A


R≦0.1
V
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
P −0.005 0

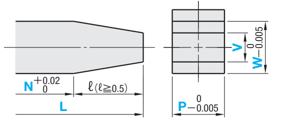
2A


R≦0.1
R≦0.1
V
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
P −0.005 0

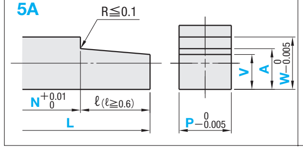
3A


V
W −0.005 0
N +0.02 0
ℓ(ℓ≧0.5)
L
P −0.005 0

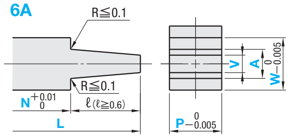
4A


V
W −0.005 0
N +0.02 0
ℓ(ℓ≧0.5)
L
P −0.005 0

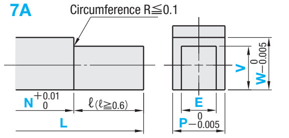
5A


R≦0.1
V
A
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
P −0.005 0

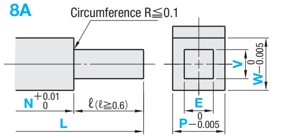
6A


R≦0.1
R≦0.1
V
A
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
P −0.005 0

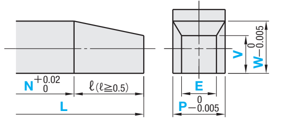
7A


Circumference R≦0.1
V
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
E
P −0.005 0

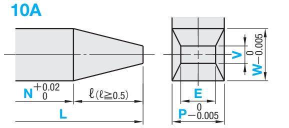
8A


Circumference R≦0.1
V
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
E
P −0.005 0

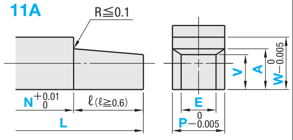
9A


V
W −0.005 0
N +0.02 0
ℓ(ℓ≧0.5)
L
E
P −0.005 0

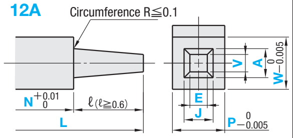
10A


V
W −0.005 0
N +0.02 0
ℓ(ℓ≧0.5)
L
E
P −0.005 0

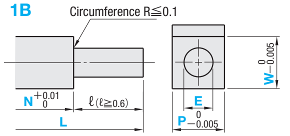
11A


R≦0.1
V
A
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
E
P −0.005 0

12A

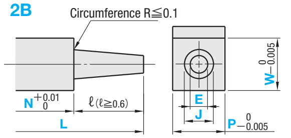

Circumference R≦0.1
V
A
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
E
J
P −0.005 0

1B


Circumference R≦0.1
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
E
P −0.005 0

Precision of E dimension is E±0.02.
E<W

2B


Circumference R≦0.1
W −0.005 0
N +0.01 0
ℓ(ℓ≧0.6)
L
E
J
P −0.005 0

Precision of E and J dimensions is E±0.02
J±0.02.
E≦J<W

Non JIS material definition is listed on P.1351 - 1352

Part Number		0.01mm increments							H	F	ℓ
Type	Shape	L	P	W	N	J・E・A・V	Emin.	Vmin.			max.
BCSH (SKH51) **BCSR** (*RIGOR®*) **BCSV** **BCSA** (*ORVAR® SUPREME*) **BCSN** (NAK80)	1A 7A 2A 8A 3A 9A 4A 10A 5A 11A 6A 12A 1B 2B	20.00 ~ *70.00	1.00～ 1.99	1.00～10.00	N> L/2	P>E P>J≧E W>V W>A≧V	0.5	0.5	4 6	0 90 180 270	ℓ≦E×5 and ℓ≦V×5 and ℓ≦5 (P<2 or W<2)
			2.00～ 3.00	1.00～15.00			1.00	1.00			
			3.01～ 5.00	1.00～20.00			1.50				
			5.01～10.00				2.50				
			10.01～15.00	2.00～20.00			5.00				
			15.01～20.00	3.01～20.00			7.50	1.50			

ORVAR®SUPREME and *RIGOR®* are registered trademarks of UDDEHOLM TOOL CO.
* P<2.00 ···› L≦50.00 W<2.00 ···› L≦50.00 BCSR : W≦3.49 ···› L≦50.00

Order

Part Number	L	P	W	N	J	E	A	V	H	F
BCSR12A	36.50	P4.39	W5.61	N31.5	J3.80	E2.80	A4.50	V4.20	H6	F0
BCSH5A	50.00	P5.05	W6.00	N30.0			A5.25	V5.25	H6	F90

Days to Ship Quotation **P** **Price** Quotation

Alterations

Part Number	L	P	W	N	J	E	A	V	H	F	(CGC・RGC・TC)
BCSR12A	36.50	P4.39	W5.61	N31.5	J3.80	E2.80	A4.50	V4.20	H6	F0	TC0.5

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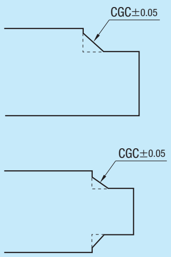
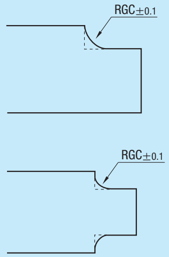
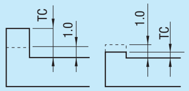
<tr><td>
CGC±0.05
CGC±0.05

</td><td>CGC</td><td>Changes the round corner (normally R≦0.1) to a designated flat C plane(45°)
CGC=0.1mm increments
0.1≦CGC≦5.0 and CGC<ℓ
Working limits for each tip shape
<table>
<tr><th>Part Number</th><th>Working limits</th></tr>
<tr><td>BCS□ 1A</td><td>CGC<(W−V)</td></tr>
<tr><td>BCS□ 2A</td><td>CGC<{(W−V)/2}</td></tr>
<tr><td>BCS□ 5A</td><td>CGC<(W−A)</td></tr>
<tr><td>BCS□ 6A</td><td>CGC<{(W−A)/2}</td></tr>
<tr><td>BCS□ 7A</td><td>CGC<(W−V) and CGC<{(P−E)/2}</td></tr>
<tr><td>BCS□ 8A</td><td>CGC<{(W−V)/2} and CGC<{(P−E)/2}</td></tr>
<tr><td>BCS□11A</td><td>CGC<(W−A)</td></tr>
<tr><td>BCS□12A</td><td>CGC<{(W−A)/2} and CGC<{(P−J)/2}</td></tr>
<tr><td>BCS□ 1B</td><td>CGC<{(P−E)/2}</td></tr>
<tr><td>BCS□ 2B</td><td>CGC<{(P−J)/2}</td></tr>
</table></td><td>Quotation</td></tr>
<tr><td>
RGC±0.1
RGC±0.1

</td><td>RGC</td><td>Changes the round corner R (normally R≦0.1)
RGC=0.1mm increments
0.1≦RGC≦5.0 and RGC<ℓ
Working limits for each tip shape
<table>
<tr><th>Part Number</th><th>Working limits</th></tr>
<tr><td>BCS□ 1A</td><td>RGC<(W−V)</td></tr>
<tr><td>BCS□ 2A</td><td>RGC<{(W−V)/2}</td></tr>
<tr><td>BCS□ 5A</td><td>RGC<(W−A)</td></tr>
<tr><td>BCS□ 6A</td><td>RGC<{(W−A)/2}</td></tr>
<tr><td>BCS□ 7A</td><td>RGC<(W−V) and RGC<{(P−E)/2}</td></tr>
<tr><td>BCS□ 8A</td><td>RGC<{(W−V)/2} and RGC<{(P−E)/2}</td></tr>
<tr><td>BCS□11A</td><td>RGC<(W−A)</td></tr>
<tr><td>BCS□12A</td><td>RGC<{(W−A)/2} and RGC<{(P−J)/2}</td></tr>
<tr><td>BCS□ 1B</td><td>RGC<{(P−E)/2}</td></tr>
<tr><td>BCS□ 2B</td><td>RGC<{(P−J)/2}</td></tr>
</table></td><td></td></tr>
<tr><td>
</td><td>TC</td><td>Changes the flange width (within the range of 0.3～3.0)
TC=0.1mm increments
L20.00 30.00 ···› 0.3≦TC≦1.5
L30.01～50.00 ···› 0.3≦TC≦2.5
L50.01～70.00 ···› 0.3≦TC≦3.0</td><td></td></tr>
</table>

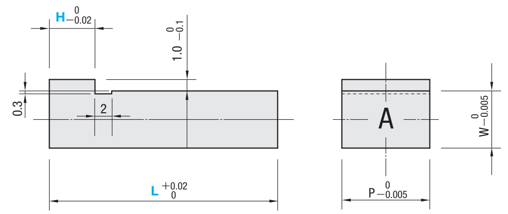
BLOCK CORE PINS WITH ENGRAVING

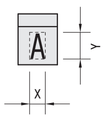
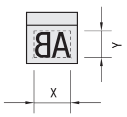
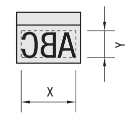
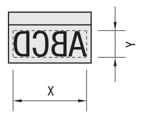
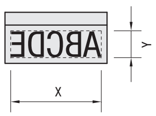
Non JIS material definition is listed on P.1351 - 1352

Tip with engraving

T P・W tolerance $_{-0.005}^{0}$

M	H	Part Number				
		1 character	2 characters	3 characters	4 characters	5 characters
SKH51	61～64HRC	BCSH1M	BCSH2M	BCSH3M	BCSH4M	BCSH5M
NAK80	37～43HRC	BCSN1M	BCSN2M	BCSN3M	BCSN4M	BCSN5M



1M (1 character)	**2M** (2 characters)	**3M** (3 characters)	**4M** (4 characters)	**5M** (5 characters)
				

P					W	Part Number			0.01mm increments	H	Characters for engraving (Round Gothic type)
1M	2M	3M	4M	5M		Type	Character	No.	L		
1.0	1.4	2.0	2.6	3.2	1.0	BCSH BCSN	1M 2M 3M 4M 5M	1	10.00～50.00	4 6	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
1.0	2.2	3.4	4.6	5.8	2.0			2			
1.2	2.8	4.4	6.0	7.2	3.0			3			
1.7	4.1	6.1	8.2	9.9	4.0			4			
2.2	5.4	7.7	10.4	12.6	5.0			5			

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	>
Less	＜	<
Plus	＋	+
Minus	－	#
Space	⬚	%

Order

Part Number	—	L	—	H	—	Characters for engraving
BCSH3M2	—	35.00	—	H4	—	MOL

Days to Ship Quotation

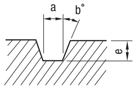
Price Quotation

■ Character size (X, Y)

X (Character Width)					Y (Character Height)
1M	2M	3M	4M	5M	
0.4	1.2	1.8	2.4	3.0	0.8
0.8	1.8	3.0	4.2	5.4	1.5
0.9	2.4	4.0	5.4	6.6	2.0
1.3	3.6	5.5	7.5	9.3	3.0
1.6	4.8	6.9	9.6	11.8	4.0

BLOCK CORE PINS	Finished products
Reverse character (Concave character)	Normal character (Convex embossed character)

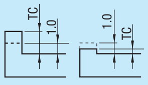
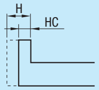
Engraving Details drawing



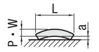
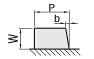
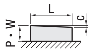
Width (a)	(0.1XY)±0.05
Angle (b°)	30° ±2°
Depth of engraving (e)	0.05±0.02

Alterations

Part Number	—	L	—	H(HC)	—	Characters for engraving	—	(TC)
BCSH3M2	—	35.00	—	HC3.5	—	MOL	—	TC0.5

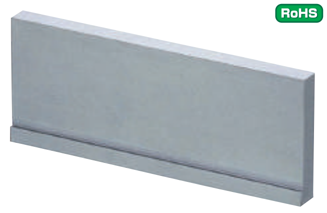
Alterations	Code	Spec.	1Code
	TC	Changes the flange width (0.3≦TC≦3.0) TC=0.1mm increments L10.00～30.00 ···› 0.3≦TC≦1.5 L30.01～50.00 ···› 0.3≦TC≦2.5	Quotation
	HC	Changes the flange thickness HC=0.1mm increments 2≦HC<H Dimension L remains unchanged.	

■Precision Standard

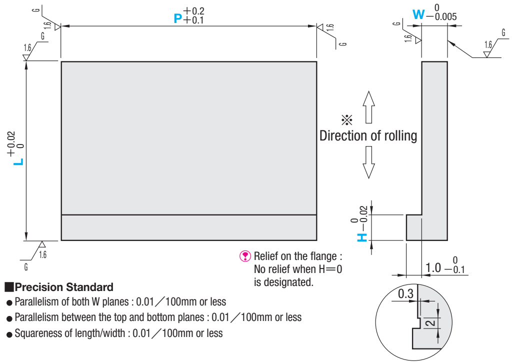
Precision Standard		Material	
		SKH51	NAK80
Warpage		a≦0.01	P・W<2 ···› a≦0.05 P・W≧2 ···› a≦0.01
Squareness		b≦0.01	
Parallelism		P・W≦10 ···› C≦0.005 P・W>10 ···› C≦0.01	

BLOCK CORE PINS
—WIDE TYPE—

Non JIS material definition is listed on P.1351 - 1352


RoHS

Part Number	M	H
BCSWH	SKH51	61～64HRC
BCSWS	*STAVAX ESR*®	27～35HRC
BCSWR	*RIGOR*®	53～55HRC
BCSWV	*ORVAR*® *SUPREME*	47～49HRC
BCSWA		51～53HRC
BCSWN	NAK80	37～43HRC



Relief on the flange : No relief when H=0 is designated.

■Precision Standard
- Parallelism of both W planes : 0.01／100mm or less
- Parallelism between the top and bottom planes : 0.01／100mm or less
- Squareness of length/width : 0.01／100mm or less

※In case of BCSWH/BCSWS, the direction of rolling may differ from the drawing.

Part Number	L 0.01mm increments	P	W 0.01mm increments	H
BCSWH (SKH51) **BCSWS** (*STAVAX ESR*®) ***BCSWR** (*RIGOR*®) **BCSWV** (*ORVAR*® *SUPREME*) **BCSWA** **BCSWN** (NAK80)	10.00 ～ * 65.00 (100.00)	25 50	1.00～20.00	0 4 6
		75 100	3.00～20.00	

STAVAX ESR® *ORVAR*® *SUPREME* and *RIGOR*® are registered trademarks of UDDEHOLM TOOL CO.

L in ( ) will be only available for BCSWH・BCSWN (W≧7.01), BCSWS (W≧5.01). BCSWH・BCSWN (L65.01～100.00) : W≧7.01 　*W＜2.00 ···› L≦50

*BCSWR : W≦3.49 ···› L≦50.00

Order

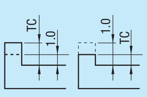
Part Number	—	L	—	P	—	W	—	H
BCSWR	—	20.00	—	P50	—	W3.00	—	H6

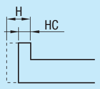
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	P	—	W	—	H(HC)	—	(TC)
BCSWH	—	30.00	—	P50	—	W2.00	—	HC5	—	TC1.3

Alteration	Code	Spec.	1Code
	TC	Changes the flange width (0.3≦TC≦3.0) TC=0.1mm increments BCSWS only (0.3≦TC≦1.0) L10.00 30.00 ···› 0.3≦TC≦1.5 L30.01～50.00 ···› 0.3≦TC≦2.5 L50.01～65.00(100.00) ···› 0.3≦TC≦3.0	Quotation

Alteration	Code	Spec.	1Code
	HC	Changes the flange thickness HC=0.1mm increments 2≦HC＜H (Dimension L remains unchanged.)	Quotation

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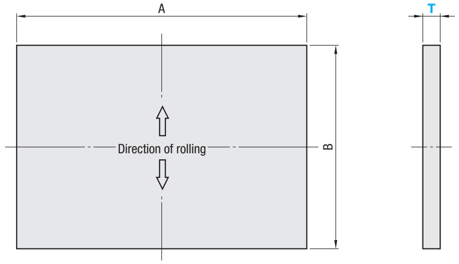
HARDENED PLATES FOR CORE
—TOP & BOTTOM 2-FACES GRINDED TYPE—

RoHS



Part Number	M	H	T Thickness	Finishing of A・B・T	Precision Standard
HPSHW	SKH51	57～63HRC	T $^{+0.05}_{+0.03}$	Finishing of T : 1.6 G Cutting marks sometimes remain on the side face (dimensions A and B).	Parallelism between the top and bottom planes : 0.02/100mm or less
HPHEW			When T≦0.8 T $^{+0.05}_{+0.02}$ When T≧1 T $^{+0.3}_{+0.1}$		Parallelism between the top and bottom planes : When T≦1.5 : 0.2/100mm or less When T≧2.0 : 0.1/100mm or less
HPSWW			T $^{+0.05}_{+0.03}$		Parallelism between the top and bottom planes : 0.1/100mm or less

A		B		T		Part Number Type	No.	U/Price 1～4	Slide Unit Price 5～9	10～29	30～50
60	+5 +0.1	50	+5 +0.1	0.8	+0.05 +0.03	**HPSHW** (SKH51)	0.8	Quotation			
				0.9			0.9				
				1			1				
100		60		1.3			1.3				
				1.5			1.5				
				1.8			1.8				
				2			2				
				2.5			2.5				
				3			3				
				3.5			3.5				
				4			4				
				4.5			4.5				
				5			5				
				5.5			5.5				
				6			6				
				8			8				
				10			10				

A		B		T		Part Number Type	No.	U/Price 1～4	Slide Unit Price 5～9	10～29	30～50
80	+5 +0.1	70	+5 +0.1	0.5	+0.05 +0.02	**HPHEW** (SKH51)	0.5	Quotation			
				0.6			0.6				
				0.8			0.8				
150		60		1	+0.3 +0.1		1				
				1.5			1.5				
				2			2				
				3			3				
				4			4				
				5			5				
				6			6				
				8			8				
				10			10				

A		B		T		Part Number Type	No.	U/Price 1～4	Slide Unit Price 5～9	10～29	30～50
200	+5 +0.1	100	+5 +0.1	1	+0.05 +0.03	**HPSWW** (SKH51)	1	Quotation			
				1.5			1.5				
				2			2				
				2.5			2.5				
				3			3				

To be quoted on price & lead time above Max. Q'ty.

Order

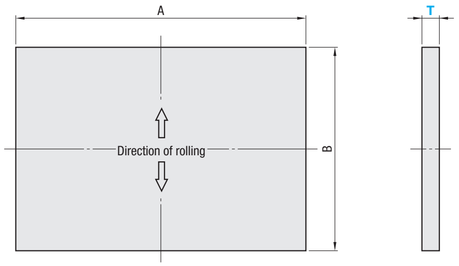
Part Number
HPSHW1
HPSWW2.5

Days to Ship Quotation

HARDENED PLATES FOR CORE

—6 FACES GRINDED TYPE—

Non JIS material definition is listed on P.1351 - 1352



Part Number	M	H	T	Finishing of A · B · T	Precision Standard
HPSH	SKH51	57～63HRC	T $^{+0.05}_{+0.03}$	Finishing of A・B・T$\overset{1.6}{\bigtriangledown}^{G}$	Squareness of A/B surfaces : 0.02/100mm or less Parallelism between the top and bottom planes : 0.02/100mm or less
HPHE	SKH51	57～63HRC	When T≦0.8 : T $^{+0.05}_{+0.02}$	Finishing of A・B・T$\overset{1.6}{\bigtriangledown}^{G}$	Squareness of A/B surfaces : 0.05/100mm or less Parallelism between the top and bottom planes : When T≦1.5 : 0.2/100mm or less When T≧2.0 : 0.1/100mm or less
HPDE	SKD61	50～53HRC	When T≧1.0 : T $^{+0.3}_{+0.1}$		

Order

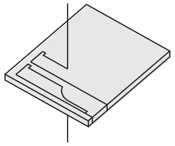
Part Number
HPSH1

Days to Ship Quotation

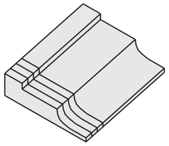
Example
- Core pins for rectangular holes on connectors/switches, etc.
- Rectangular ejector pins, etc.

(1) Processing method

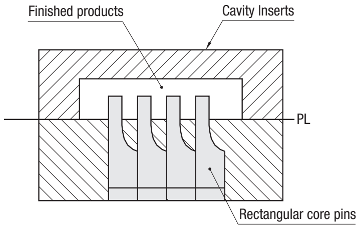
- Wire cutting



- Cut after shaping



(2) Example of Core Pin Usage



A		B		T		Part Number Type	No.	U/Price 1～4	Slide Unit Price 5～9	10～29	30～50
80	$^{+0.3}_{+0.1}$	70	$^{+0.3}_{+0.1}$	1	$^{+0.05}_{+0.03}$	**HPSH** (SKH51)	1	Quotation			
				1.3			1.3				
				1.5			1.5				
				1.8			1.8				
				2			2				
100		80		3			3				
				4			4				
				5			5				
				6			6				

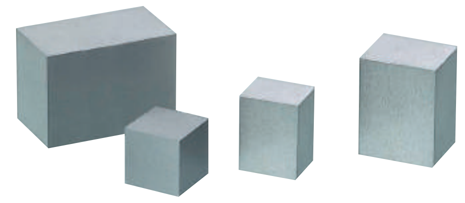
A		B		T		Part Number Type	No.	U/Price 1～4	Slide Unit Price 5～9	10～29	30～50
80	$^{+1.0}_{0}$	70	$^{+1.0}_{0}$	0.5	$^{+0.05}_{+0.02}$	**HPHE** (SKH51)	0.5	Quotation			
				0.6			0.6				
				0.8			0.8				
150	$^{+1.0}_{0}$	60	$^{+1.0}_{0}$	1	$^{+0.3}_{+0.1}$		1				
				1.5			1.5				
				2			2				
				3			3				
				4			4				
				5			5				
				6			6				
150	$^{+1.0}_{0}$	60	$^{+1.0}_{0}$	1	$^{+0.3}_{+0.1}$	**HPDE** (SKD61)	1				
				1.5			1.5				
				2			2				
				3			3				
				4			4				
				5			5				
				6			6				

CAVITY INSERT BLOCK BLANKS

—NO REFERENCE PLANE TYPE／REFERENCE PLANE TYPE (4 FACES GRINDED, 2 FACES MILLED)—

Non JIS material definition is listed on P.1351 - 1352

RoHS

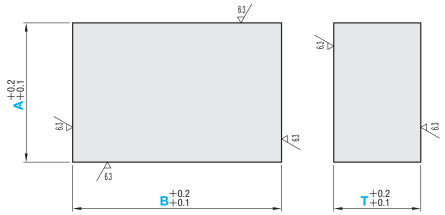


No reference plane type

Part Number		M	HT Heat Treatment	H
NAK55	**F**	NAK55	Prehardened steel	37～43HRC
NAK80	**F**	NAK80		
DH2F	**F**	DH2F		38～42HRC
PX5	**F**	PX5		30～33HRC
S50CT	**F**	S50C	Heat-treated steel	22～28HRC
S—STAR	**F**	S—STAR	Prehardened steel	31～34HRC
HPM38	**F**	HPM38		30～33HRC
STAVAXT	**F**	***STAVAXESR***®		31～35HRC
S50C	**F**	S50C	Unannealed steel	—
SKD61	**F**	SKD61		
SKD11	**F**	SKD11		
RIGOR	**F**	***RIGOR***®		Approx. 215HB

S—STAR is a new steel type that replaces PD555.

STAVAXESR® and ***RIGOR***® are registered trademarks of UDDEHOLM TOOL CO.



Reference plane type (4 faces grinded, 2 faces milled)

Part Number		M	HT Heat Treatment	H
S50C	**K**	S50C	Unannealed	—
SKD61	**K**	SKD61		
SKD11	**K**	SKD11		
RIGOR	**K**	***RIGOR***®		Approx. 215HB

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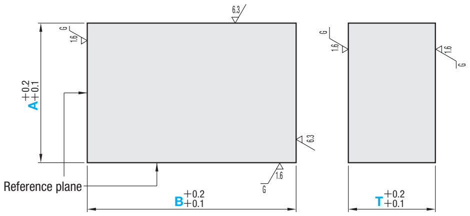


■Precision Standard

		No reference plane type	Reference plane type
• **Squareness**	per 100mm	0.02 or less	0.01 or less
• **Parallelism between the top and bottom planes**	per 100mm	0.02 or less	0.01 or less
• **Flatness of the top and bottom planes**	T / per 100mm	25.9 or less / ～0.04 26.0 or more / ～0.03	25.9 or less / ～0.015 26.0 or more / ～0.012
• **Circumference chamfering**		Approx. C0.03	Approx. C0.03

Part Number		
No reference plane type		
NAK55	**F**	(NAK55)
NAK80	**F**	(NAK80)
DH2F	**F**	(DH2F)
PX5	**F**	(PX5)
S50CT	**F**	(S50C Heat-treated steel)
S—STAR	**F**	(S—STAR)
HPM38	**F**	(HPM38)
STAVAXT	**F**	(***STAVAXESR***®Prehardened steel)
S50C	**F**	(S50C Unannealed)
SKD61	**F**	(SKD61)
SKD11	**F**	(SKD11)
RIGOR	**F**	(***RIGOR***®)
Reference plane type		
S50C	**K**	(S50C Unannealed)
SKD61	**K**	(SKD61)
SKD11	**K**	(SKD11)
RIGOR	**K**	(***RIGOR***®)

Part Number	0.1mm increments		
	A	B	T
No reference plane type	8.0～19.9	8.0～50.0	8.0～20.0
	20.0～30.0	20.0～300.0	15.0～30.0
	30.1～40.0		15.0～40.0
	40.1～50.0		15.0～50.0
	50.1～120.0		15.0～60.0
Reference plane type	120.1～200.0		20.0～ 60.0 *20.0～100.0 (*Available for NAK55F/NAK80F/PX5F/S50CF only)

STAVAXESR® and ***RIGOR***® are registered trademarks of UDDEHOLM TOOL CO.

Order

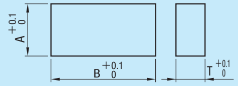
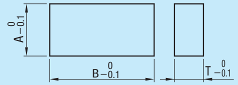
Part Number	—	A	—	B	—	T
NAK55F	—	A45.8	—	B48.1	—	T36.2

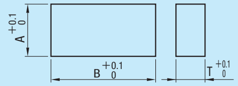
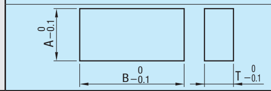
Days to Ship Quotation

Price Quotation

Alterations

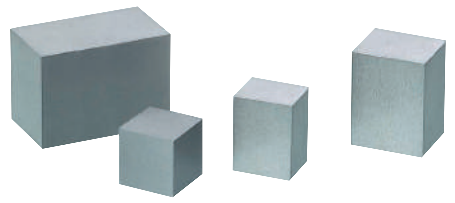
Part Number	—	A	—	B	—	T	—	(CPF · CMF···etc.)
NAK55F	—	A50.2	—	B45.1	—	T33.2	—	CPF

	Alterations	Code	Spec.	1Code
Applicable to no reference plane type		**CPF**	Finishes with a $^{+0.1}_{0}$ tolerance range (normally, $^{+0.2}_{+0.1}$).	Quotation
		**CMF**	Finishes with a $^{0}_{-0.1}$ tolerance range (normally, $^{+0.2}_{+0.1}$).	

	Alterations	Code	Spec.	1Code
Applicable to reference plane type (4 face-grinded · 2 face-milled)		**CPK**	Finishes with a $^{+0.1}_{0}$ tolerance range (normally, $^{+0.2}_{+0.1}$).	Quotation
		**CMK**	Finishes with a $^{0}_{-0.1}$ tolerance range (normally, $^{+0.2}_{+0.1}$).	

CAVITY INSERT BLOCKS

—6 FACE-GRINDED TYPE—



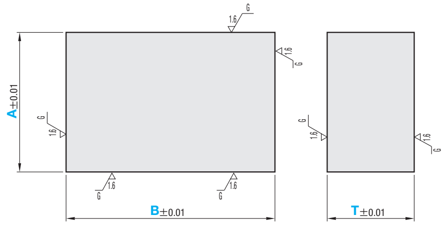
RoHS

T ±0.01 (Standard)

Part Number		M	HT Heat Treatment	H
NAK55	G	NAK55	Prehardened steel	37～43HRC
NAK80	G	NAK80		
DH2F	G	DH2F		38～42HRC
PX5	G	PX5		30～33HRC
S50CT	G	S50C	Heat-treated steel	22～28HRC
S—STAR	G	S—STAR	Prehardened steel	31～34HRC
HPM38	G	HPM38		30～33HRC
STAVAXT	G	*STAVAXESR*®		31～35HRC

S—STAR is a new steel type that replaces PD555.

STAVAXESR® is a registered trademark of UDDEHOLM TOOL CO.

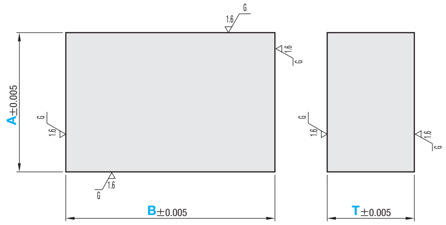


T ±0.005 (Precision)

Part Number		M	HT Heat Treatment	H
NAK55	P	NAK55	Prehardened steel	37～43HRC
NAK80	P	NAK80		
DH2F	P	DH2F		38～42HRC
S—STAR	P	S—STAR		31～34HRC
HPM38	P	HPM38		30～33HRC
STAVAXT	P	*STAVAXESR*®		31～35HRC

S—STAR is a new steel type that replaces PD555.

STAVAXESR® is a registered trademark of UDDEHOLM TOOL CO.



Order

Part Number	—	A	—	B	—	T
NAK55G	—	A54.86	—	B48.13	—	T36.27

Price Quotation

Days to Ship Quotation

Precision Standard

- **Squareness** 0.01 or less per 100mm
- **Parallelism between the top and bottom planes** 0.01 or less per 100mm
- **Flatness of the top and bottom planes** 0.01 or less per 100mm
- **Circumference chamfering** Approx. C0.03

Non JIS material definition is listed on P.1351 - 1352

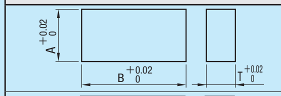
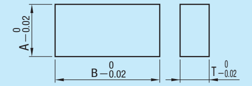
	Part Number		0.01mm increments		
			A	B	T
Standard (±0.01)	NAK55	G (NAK55)	8.00～ 19.99	8.00～50.00	8.00～ 20.00
	NAK80	G (NAK80)	20.00～ 30.00	20.00 ～ 300.00	15.00～ 30.00
	DH2F	G (DH2F)	30.01～ 40.00		15.00～ 40.00
	PX5	G (PX5)	40.01～ 50.00		15.00～ 50.00
	S50CT	G (S50C Heat-treated steel)	50.01～120.00		15.00～ 60.00
	S—STAR	G (S—STAR)	120.01～200.00		20.00～ 60.00 *20.00～100.00 (*Available for NAK55G/NAK80G/PX5G only)
	HPM38	G (HPM38)			
	STAVAXT	G (*STAVAXESR*®Prehardened steel)			
Precision (±0.005)	NAK55	P (NAK55)	8.00～ 19.99	8.00～50.00	8.00～20.00
	NAK80	P (NAK80)	20.00～ 30.00	20.00 ～ 200.00	15.00～30.00
	DH2F	P (DH2F)	30.01～ 40.00		15.00～40.00
	S—STAR	P (S—STAR)	40.01～ 50.00		15.00～50.00
	HPM38	P (HPM38)	50.01～120.00		15.00～60.00
	STAVAXT	P (*STAVAXESR*®Prehardened steel)	120.01～200.00		20.00～60.00

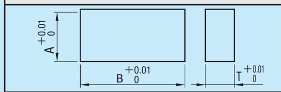
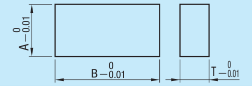
STAVAXESR® is a registered trademark of UDDEHOLM TOOL CO.

Alterations

Part Number	—	A	—	B	—	T	—	(CPG · CMG···etc.)
NAK55G	—	A54.86	—	B48.13	—	T36.27	—	CPG

Quotation

	Alterations	Code	Spec.	1Code
Available for Standard Type T ±0.01		CPG	Finishes with a $^{+0.02}_{0}$ tolerance range. (Normally, ±0.01).	Quotation
		CMG	Finishes with a $^{0}_{-0.02}$ tolerance range. (Normally, ±0.01).	

	Alterations	Code	Spec.	1Code
Available for Precision Type T ±0.005		CPP	Finishes with a $^{+0.01}_{0}$ tolerance range. (Normally, ±0.005) ⊗ Express services not available	Quotation
		CMP	Finishes with a $^{0}_{-0.01}$ tolerance range. (Normally, ±0.005) ⊗ Express services not available	

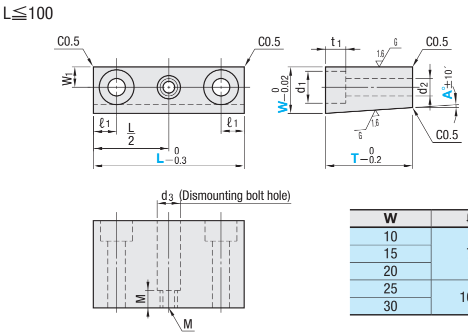
CAVITY INSERT WEDGES

—TAPERED TYPE—

Non JIS material definition is listed on P.1351 - 1352

Part Number	M	H
ICS	SKS3	53～56HRC
ICH	HPM2T equivalent	37～41HRC

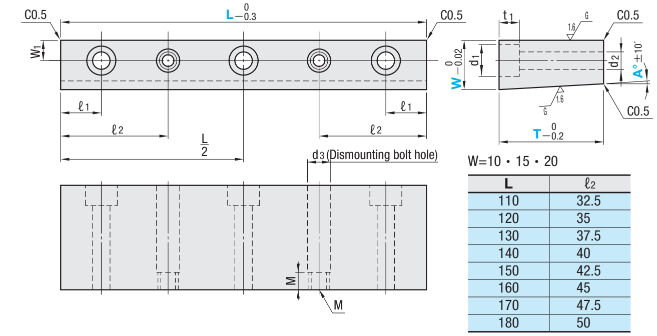
L≦100



C0.5
C0.5
W1
ℓ1
ℓ1
L/2
L $_{-0.3}^{0}$
W $_{-0.02}^{0}$
d1
t1
1.6
G
C0.5
d2
A°±10'
1.6
G
C0.5
T $_{-0.2}^{0}$
d3 (Dismounting bolt hole)
M
M

W	ℓ1
10	7.5
15	
20	
25	10
30	

L≧110



C0.5
L $_{-0.3}^{0}$
C0.5
W1
ℓ1
ℓ1
ℓ2
ℓ2
L/2
t1
1.6
G
C0.5
W $_{-0.02}^{0}$
d1
d2
A°±10'
1.6
G
C0.5
T $_{-0.2}^{0}$
d3 (Dismounting bolt hole)
M
M

W	ℓ1
10	10
15	
20	
25	15
30	

W=10・15・20

L	ℓ2
110	32.5
120	35
130	37.5
140	40
150	42.5
160	45
170	47.5
180	50

W=25・30

L	ℓ2
110	35
120	37.5
130	40
140	42.5
150	45
160	47.5
170	50
180	52.5

d_1	d_2	d_3	t_1	M	W_1	Part Number Type	 W	T	L 10mm increments	A
8	4.5	5	5	4	5	**ICS** (SKS3) **ICH** (HPM2T equivalent)	10	15	30～100	1 3 5
								20		
								*25	30～180	
								*30		
11	6.5	7	7	6	6.5		15	20	40～180	
								25		
								30		
								35		
								40		
								*45		
								*50		
					7		20	20		
								25		
								30		
								35		
								40		
								45		
								50		
								60		
								70		
								80		
14	9	9	9	8	9		25	30	50～180	
								35		
								40		
								45		
								50		
								60		
								70		
								80		
					11		30	40		
								45		
								50		
								60		
								70		
								80		

* Only A1/3 can be selected when W10—T25／30, W15—T45／50.

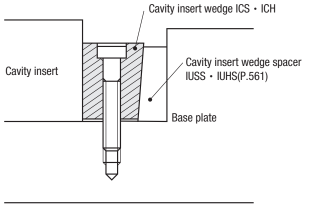
Order

Part Number	—	T	—	L	—	A
ICS15	—	20	—	L120	—	A5

Price Quotation

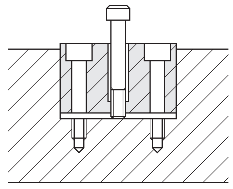
Days to Ship Quotation

Example



Cavity insert wedge ICS・ICH
Cavity insert
Cavity insert wedge spacer
IUSS・IUHS(P.561)
Base plate

●How to remove the insert



Insert a bolt into the dismounting bolt hole. Turn the bolt to make the insert come out from the base plate.

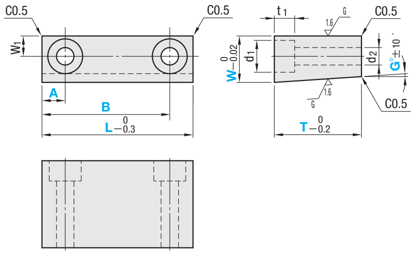
CAVITY INSERT WEDGES

—BOLT HOLE POSITION FREE TYPE—

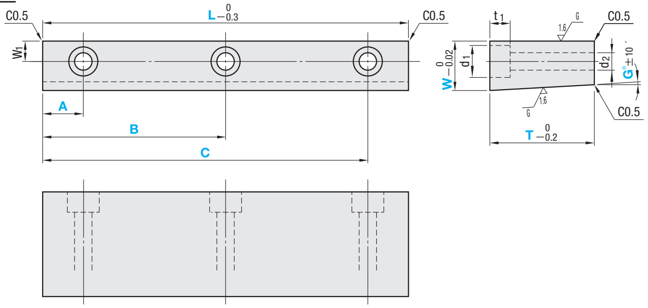
Non JIS material definition is listed on P.1351 - 1352

Part Number	M	H
ICSM	SKS3	53～56HRC
ICHM	HPM2T equivalent	37～41HRC

L≦100



L≧110



d1	d2	t1	W1	Part Number		T	L	G	0.5mm increments		
				Type	W		10mm increments		A	B	C
8	4.5	5	5	**ICSM** (SKS3) **ICHM** (HPM2T equivalent)	10	15 20	30～100	1 3 5	6≦A≦(L−16)	(A+10)≦B≦(L−6)	—
						*25 *30	30～180		7.5≦A≦(L−33.5)	(A+13)≦B≦(L−20.5)	(B+13)≦C≦(L−7.5)
11	6.5	7	6.5		15	20 25 30 35 40 *45 *50	40～100		7.5≦A≦(L−20.5)	(A+13)≦B≦(L−7.5)	—
							110～180		7.5≦A≦(L−33.5)	(A+13)≦B≦(L−20.5)	(B+13)≦C≦(L−7.5)
			7		20	20 25 30 35 40 45 50 60 70 80	40～100		7.5≦A≦(L−20.5)	(A+13)≦B≦(L−7.5)	—
							110～180		7.5≦A≦(L−33.5)	(A+13)≦B≦(L−20.5)	(B+13)≦C≦(L−7.5)
14	9	9	9		25	30 35 40 45 50 60 70 80	50～100		9≦A≦(L−25)	(A+16)≦B≦(L−9)	—
							110～180		9≦A≦(L−41)	(A+16)≦B≦(L−25)	(B+16)≦C≦(L−9)

* Only G1/3 can be selected when W10—T25/30, W15—T45/50.

Order

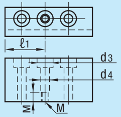
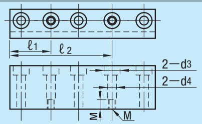
Part Number	—	T	—	L	—	G	—	A	—	B	—	C
ICSM 15	—	40	—	L120	—	G5	—	A20	—	B40	—	C100

Days to Ship Quotation

Price Quotation

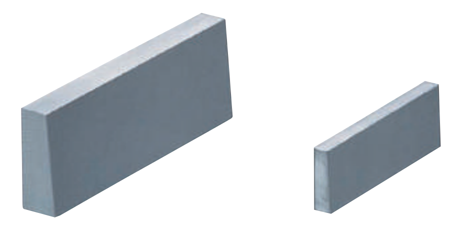
Alterations

Part Number	—	T	—	L	—	G	—	A	—	B	—	C	—	(MC)
ICSM 15	—	40	—	L120	—	G5	—	A20	—	B50	—	C100	—	MC

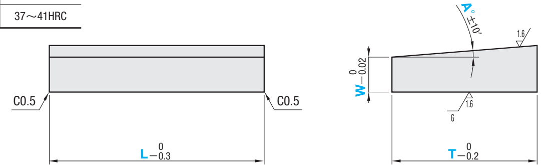
Alterations	Code	Spec.					1Code
 ℓ1 d3 d4 M M	MC	Drilling of dismounting bolt holes (L≦100) ℓ1=(A+B)/2 W=10 ···› B−A≧20 W=15・20 ···› B−A≧26 W=25 ···› B−A≧32	W	d3	d4	M	Quotation
			10	8	4.5	4	
			15・20	11	6.5	6	
			25	14	9	8	
 ℓ1 ℓ2 2−d3 2−d4 M M		Drilling of dismounting bolt holes (L>100) ℓ1=(A+B)/2 ℓ2=(B+C)/2 W=10 ···› B−A and C−B≧20 W=15・20 ···› B−A and C−B≧26 W=25 ···› B−A and C−B≧32	W	d3	d4	M	
			10	8	4.5	4	
			15・20	11	6.5	6	
			25	14	9	8	

CAVITY INSERT WEDGE SPACERS

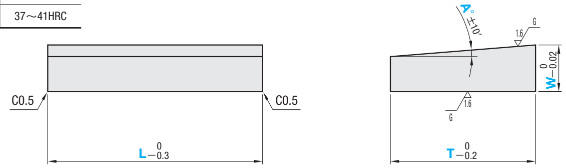
Non JIS material definition is listed on P.1351 - 1352



Part Number	M	H
ICSS	SKS3	53～56HRC
ICHS	HPM2T equivalent	37～41HRC


C0.5
C0.5
L 0 −0.3
A°±10'
1.6
W 0 −0.02
1.6
G
T 0 −0.2

Part Number	M	H
IUSS	SKS3	53～56HRC
IUHS	HPM2T equivalent	37～41HRC


C0.5
C0.5
L 0 −0.3
A°±10'
1.6
G
W 0 −0.02
1.6
G
T 0 −0.2

Part Number		T	L	A
Type	W		10mm increments	
ICSS (SKS3) **ICHS** (HPM2T equivalent)	5	15	30～100	1 3 5
		20		
		25	30～180	
		30		
		35		
		40		
		45		
		50		
		60		
		70		
		80		
	10	20	40～180	
		25		
		30		
		35		
		40		
		45		
		50		
		60		
		70		
		80		

Part Number		T	L	A	Example of cavity insert combination
Type	W		10mm increments		W−T
IUSS (SKS3) **IUHS** (HPM2T equivalent)	5	20	20～100	1	10—20
	9	15			6—15
	10	20	30～180	3	10—20
		25			10—25
		30			10—30
	12	15	30～100		8—15
		20	30～180	5	8—20
		25			8—25

Order

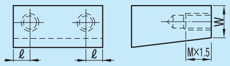
Part Number	—	T	—	L	—	A
ICSS5	—	20	—	L100	—	A5

Days to Ship Quotation

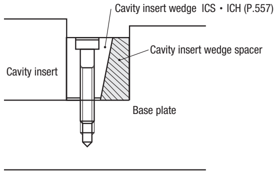
Price Quotation

Alterations

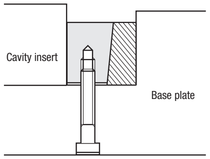
Part Number	—	T	—	L	—	A	—	(MC)
ICSS5	—	20	—	L100	—	A5	—	MC

Alteration	Code	Spec.	1Code
	MC	Adds a tap on the designated side of W dimension. W 5 / M 3; W 10 / M 5 L 30・40 / ℓ 7.5; L 50～100 / ℓ 10; L 110～180 / ℓ 15 Available for ICSS・ICHS only	Quotation

Example


Cavity insert wedge ICS・ICH (P.557)
Cavity insert wedge spacer
Cavity insert
Base plate

• This spacer can also be used as a cavity insert by applying MC alteration.


Cavity insert
Base plate

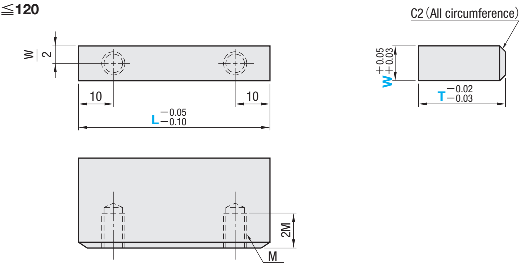
CAVITY INSERT WEDGES

—PARALLEL TYPE—

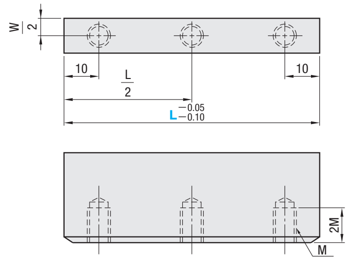
Non JIS material definition is listed on P.1351 - 1352

Part Number	M	H
IPS	SKS3	53～56HRC

L≦120


C2 (All circumference)
W/2
10
10
$L^{-0.05}_{-0.10}$
$W^{+0.05}_{+0.03}$
$T^{-0.02}_{-0.03}$
2M
M

L≧130


W/2
10
L/2
10
$L^{-0.05}_{-0.10}$
2M
M

M	Part Number		T	L
	Type	W	5mm increments	10mm increments
5	IPS	8	20～40	30～200
6		10		
		15		
8		20		
		25		

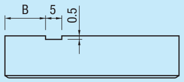
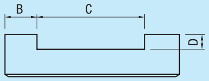
Order

Part Number	—	T	—	L
IPS 15	—	30	—	150

Days to Ship Quotation

Alterations

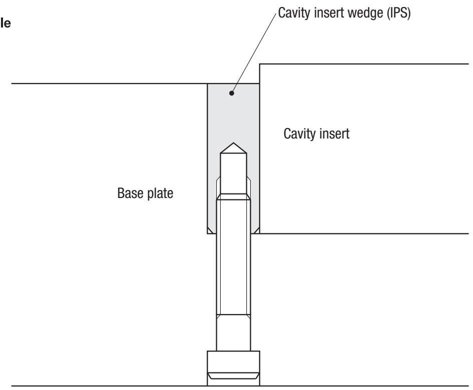
Part Number	—	T	—	L	—	(AVC・SRC)
IPS 15	—	30	—	150	—	AVC—B100

Alterations	Code	Spec.	1Code
 B 5 0.5	AVC	(Air vent processing) B=5mm increments 0≦B≦L—5 Designation method AVC—B100	Quotation
 B C D	SRC	(Slide core relief processing) B・C・D=5mm increments 0≦B≦L—5, 5≦D≦T/2, 0≦C≦L—5, B+C≦L—5 D<T—2M Designation method SRC—B30—C60—D10	

⊗ AVC and SRC cannot be combined.

Price Quotation

Example


Cavity insert wedge (IPS)
Cavity insert
Base plate

STEEL PLATES

STEEL PLATES

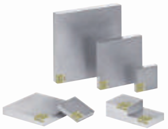
Product Name
Part Number

Ground plates for wedm —Standard / Thickness (T) 0.01mm increments designation type—
S50CWP · T—S50CWP

Internet

Ground plates for wedm —Standard / Thickness (T) 0.01mm increments designation type—
STAVAXWP · T—STAVAXWP **PX5WP · T—PX5WP** **DH2FWP · T—DH2FWP** **SKD11WP · T—SKD11WP**

Internet



High-precision ground plates —Free size type—
NAK55HP · NAK55MP **NAK80HP · NAK80MP**

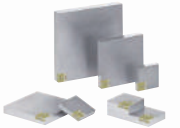
Ground plates —Standard / Free size type—
S50CSP · F—S50CSP **NAK55SP · F—NAK55SP** **NAK80SP · F—NAK80SP**

Internet

Ground plates —Standard / Free size type—
STAVAXSP · F—STAVAXSP **PX5SP · F—PX5SP**

Milled plates —Standard / Free size type—
S50CFP · F—S50CFP **NAK55FP · F—NAK55FP** **NAK80FP · F—NAK80FP**

Internet



Milled plates —Standard / Free size type—
STAVAXFP · F—STAVAXFP **PX5FP · F—PX5FP** **DH2FFP · F—DH2FFP** **SKD11FP · F—SKD11FP**

Finished plates —Standard / Free size type—
S50CRP · F—S50CRP

Internet

Finished plates —Standard / Free size type—
NAK55RP · F—NAK55RP **NAK80RP · F—NAK80RP** **SKD11RP · F—SKD11RP**

Plates with water hole and / or heater hole —Free size type—
M—S50CFP · M—S50CRP · M—S50CSP

Internet

Internet catalog is not available in some subsidiaries.

STEEL PLATES GUIDE

—LIST OF STEEL PLATES／MATERIAL CHARACTERISTICS—

■LIST OF STEEL PLATES

Plates series			High-precision ground plates	Ground plates	Ground plates for wedm	Milled plates	Finished plates	With water hole and heater hole
Finishing			Polished 6-face surface	Polished 6-face surface	Top & bottom 2-face: Polished surface Others: Milled	Milled 6-face surface	Top & bottom 2-face: Rotary-polished Others: Milled	Top & bottom 2-face: Polished surface Rotary-polished Milled Others: Milled
M H	**S50C (Unannealed)**	Standard	—	**S50CSP**	**S50CWP**	**S50CFP**	**S50CRP**	—
		Free size	—	**F—S50CSP**	* **T—S50CWP**	**F—S50CFP**	**F—S50CRP**	**M—S50CFP** **M—S50CRP** **M—S50CSP**
	NAK55 (37～43HRC)	Standard	—	**NAK55SP**	—	**NAK55FP**	**NAK55RP**	—
		Free size	**NAK55HP** **NAK55MP**	**F—NAK55SP**	—	**F—NAK55FP**	**F—NAK55RP**	—
	NAK80 (37～43HRC)	Standard	—	**NAK80SP**	—	**NAK80FP**	**NAK80RP**	—
		Free size	**NAK80HP** **NAK80MP**	**F—NAK80SP**	—	**F—NAK80FP**	**F—NAK80RP**	—
	STAVAX ESR® (27～35HRC)	Standard	—	**STAVAXSP**	**STAVAXWP**	**STAVAXFP**	—	—
		Free size	—	**F—STAVAXSP**	* **T—STAVAXWP**	**F—STAVAXFP**	—	—
	PX5 (30～33HRC)	Standard	—	**PX5SP**	**PX5WP**	**PX5FP**	—	—
		Free size	—	**F—PX5SP**	* **T—PX5WP**	**F—PX5FP**	—	—
	DH2F (38～42HRC)	Standard	—	—	**DH2FWP**	**DH2FFP**	—	—
		Free size	—	—	* **T—DH2FWP**	**F—DH2FFP**	—	—
	SKD11 (Unannealed)	Standard	—	—	**SKD11WP**	**SKD11FP**	**SKD11RP**	—
		Free size	—	—	* **T—SKD11WP**	**F—SKD11FP**	**F—SKD11RP**	—

STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.
*Free size of ground plates for wedm are thickness (T) 0.01mm increments type.

■Material characteristics of steel plates

Items		Mechanical property			Physical property				
		Tensile strength	Proof stress	Charpy impact	Coefficient of thermal expansion		Coefficient of thermal conductivity		Specific gravity
		20℃	20℃	—	20℃～100℃	20℃～200℃	100℃	200℃	20℃
Unit		N/mm²	N/mm²	J/cm²	×10⁻⁶/℃	×10⁻⁶/℃	W(m・℃)	W(m・℃)	g/cm²
M	**S50C**	Quenching 810～860 water-cooled Tempering 550～650 rapid-quenched 740 or more	540 or more	69 or more	11.5	12.3	50.2	46	7.87
	NAK55	1255	981	18	11.3	12.5	38.9	41.9	7.8
	NAK80	1255	1010	21.5	11.3	12.5	38.9	41.9	7.8
	STAVAX ESR®	1130	900	10.0	10.7	11	(20℃) 16	20	7.8
	PX5	990	880	65	11.9	12.7	42.4	42.1	7.85
	DH2F	1330	1100	40	8.9	10.8	25.5	—	7.75
	SKD11 (After quenching 57～60HRC)	approx. 1000	approx. 1000	30	12	12.5	27.2	—	7.7

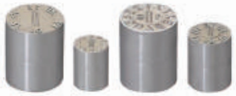
STAVAX ESR® is a registered trademark of UDDEHOLM TOOL CO.
The data will vary depending upon heat treatment conditions and also the conditions of use, so use it only as a rough guide.

DATE MARKED PINS · RECYCLE MARKED PINS · PINS WITH GAS VENT

DATE MARKED PINS
RECYCLE MARKED PINS
PINS WITH GAS VENT

Product Name Part Number	Date Marked Pin Sets−PL exchange type− DTBX DTBXU DTX DTXU DTXS DTXSU DT□X DT□XU DTMBX DTX□M	Inside Arrows for PL Exchange Type DYYX DYYXU DNX DNXU DYMX	Outside Rings for PL Exchange Type DTX−R DT□X−R DTXS−R DTX−R□M
Page	571	573	574

Date Marked Pin Sets−Plate-side exchange type− DTAA DTAAU DTBB DTBBU DT DTU DTS DTSU DT□ DT□U DTM□ DT□M	Inside Arrows for Plate-side Exchange Type DYY DYYU DN DNU DYM	Outside Rings for Plate-side Exchange Type DT−R DTS−R DT□−R DT−R□M
575	577	578



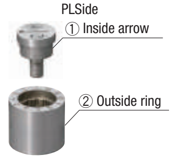
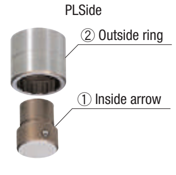
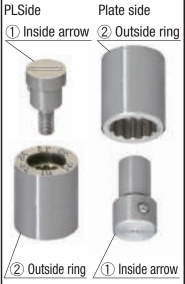
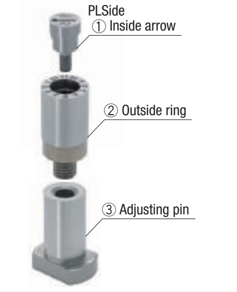
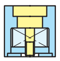
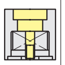
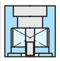
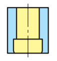
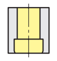
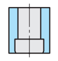
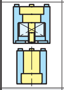
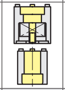
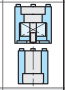
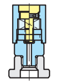
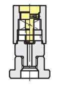
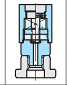
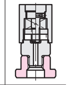
Date Marked Pin Sets −PL Exchange · Outer Corner Tapered Type− DT□□□T DT□□−RT	DTX−RT□M	Date Marked Pin Sets −Plate-side Exchange · Outer Corner Tapered Type− DT□□□T DT□−RT	DT−RT□M	Date Marked Pin Sets−Convex Character Type− DT□□C DT□□−RC DYY□□ DN□□
579	580	581	582	583 · 584

Date Marked Pin Sets−Double Ring Type− DTBZ DTEZ	SCREWDRIVER FOR DATE MARKED PIN SET DTPPN
586	586

Date Marked Pin Sets−L adjustable type− DTBXL DT□XL CPWDT−L	−Inside Arrow · Character Designation Type− DTMBXL	−Outside Ring · Character Designation Type− DTXL□M	−Outside Rings− DT□XL−R DTXL−R□M
589	590	590	591

Recycle Marked Pins for Identification of Plastic Packaging RMP□M	Recycle Marked Pins RM□□	Gas Vents TSV□	Cavity Inserts for Gas Release−Round shape− BGVS	Vacuum Unit AVBN	Gas Vent Units MSTV	Spacers For Gas Vent Unit MSTVS MSTVM	Gas release assist units(Vacuum Generator) M−VCL M−VCLH
593	593	594	595	596	597	598	599

■ Examples of Combination for Date Marked Pin Sets

Type		PL exchange type			Plate-side exchange type			Convex character type			Adjustable type			
Mounting		Press-fit mounting			Press-fit mounting			Press-fit mounting			Core pin mounting			
Inside arrow exchange		PL exchange type			Plate-side exchange type			PL exchange · Plate-side exchange type			PL exchange type			
Indication*		 PLSide ① Inside arrow ② Outside ring			 PLSide ② Outside ring ① Inside arrow			 PLSide Plate side ① Inside arrow ② Outside ring ② Outside ring ① Inside arrow			 PLSide ① Inside arrow ② Outside ring ③ Adjusting pin			
		Set (①+②)	①Inside arrow	②Outside ring	Set (①+②)	①Inside arrow	②Outside ring	Set (①+②)	①Inside arrow	②Outside ring	Set (①+②)	①Inside arrow	②Outside ring	③Adjusting pin
														
		P.571 P.572 P.579	P.573	P.574 P.580	P.575 P.576 P.581	P.577	P.578 P.582	P.583 P.584	P.583 P.584	P.583 P.584	P.589 ~ P.592	P.573	P.591	P.590
Year · Month		DTBX DTBXU DTBXT DTBXUT	DYYX DYYXU	DTDX−R DTDX−RT	DTAA DTAAU (XYZ indication) DTBB DTBBU (10,11,12 indication) DTAAT DTAAUT DTBBT DTBBUT	DYY DYYU	DTC−R (XYZ indication) DTD−R (10,11,12 indication) DTC−RT DTD−RT	DTBXC DTAAC DTBBC	DYYXC DYYC	DTDX−RC DTC−RC DTD−RC	DTBXL	DYYX DYYXU	DTDXL−R	CPWDT−L
Year		DTX DTXU DTXT DTXUT	DNX DNXU	DTX−R DTX−RT	DT DTU DTT DTUT	DN DNU	DT−R DT−RT	DTXC DTHC	DNXC DNC	DTX−RC DTH−RC	—	—	—	
Year		DTXS DTXSU DTXST DTXSUT	DNX DNXU	DTXS−R DTXS−RT	DTS DTSU DTST DTSUT	DN DNU	DTS−R DTS−RT	DTXSC DTSC	DNXC DNC	DTXS−RC DTS−RC	—	—	—	—
Month		DTDX DTDXU DTDXT DTDXUT	DNX DNXU	DTDX−R DTDX−RT	DTC DTCU (XYZ indication) DTD DTDU (10,11,12 indication) DTCT DTCUT DTDT DTDUT	DN DNU	DTC−R (XYZ indication) DTD−R (10,11,12 indication) DTC−RT DTD−RT	DTDXC DTCC DTDC	DNXC DNC	DTDX−RC DTC−RC DTD−RC	DTDXL	DNX DNXU	DTDXL−R	CPWDT−L
Day (1st digit)		DTEX DTEXU DTEXT DTEXUT	DNX DNXU	DTEX−R DTEX−RT	DTE DTEU DTET DTEUT	DN DNU	DTE−R DTE−RT	DTEXC DTEC	DNXC DNC	DTEX−RC DTE−RC	DTEXL	DNX DNXU	DTEXL−R	
Day (2nd digit)		DTFX DTFXU DTFXT DTFXUT	DNX DNXU	DTFX−R DTFX−RT	DTF DTFU DTFT DTFUT	DN DNU	DTF−R DTF−RT	DTFXC DTFC	DNXC DNC	DTFX−RC DTF−RC	DTFXL	DNX DNXU	DTFXL−R	
Day		DTGX DTGXU	DNX	DTGX−R	DTG DTGU	DN	DTG−R	—	—	—	—	—	—	—
No-marking type		DTNX DTNXU	DNX	DTNX−R	DTN DTNU	DN	DTN−R							
Inside arrow character designation type		DTMBX	DYMX	DTDX−R	DTMA (XYZ indication) DTMB (10,11,12 indication)	DYM	DTC−R (XYZ indication) DTD−R (10,11,12 indication)	—	—	—	DTMBXL	DYMX	DTDXL−R	CPWDT−L
Outside ring character designation type		DTX□M	DNX	DTX−R□M DTX−RT□M	DT□M	DN	DT−R□M DT−RT□M	—	—	—	DTXL□M	DNX	DTXL−R□M	

*The indication may vary depending on the shaft size. For details, refer to the Catalog page for each product.

GUIDE FOR DATE MARKED PIN SETS

PL EXCHANGE TYPE

PLATE SIDE EXCHANGE TYPE

Non JIS material definition is listed on P.1351 - 1352

■Features of Date Marked Pin Sets

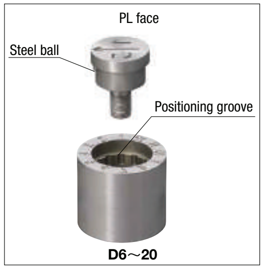
- Improves productivity. The inside arrow can be replaced from the PL side (internal side of the die) without removing the plate.
  (PL exchange type only)
- Facilitates quality control and lot management of finished products.
- The month indication can be easily changed from the PL side (internal side of the die).
  (Simply turn the arrow using a screw driver.)
- Incorporates a steel ball stopper mechanism that is superior than an O-ring stopper in positioning accuracy, and more tolerate to gas and heat that are generated during molding.

■Structure and Usage

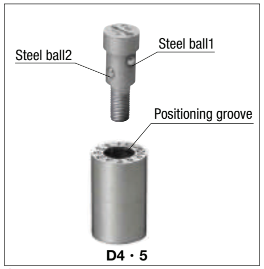
PL exchange type

Item	M	H
❶ Inside arrow	SUS420	50～53HRC
❷ Outside ring		
❸ Steel ball	SUS440C	58HRC～
❹ ❺ Spring	SUS304	—
❻ Adjusting nut	SUS420	50～53HRC
❼ Cap		

D	h	S	Effective revolution
4	1.9	0.6	3 revolutions
5	1.9	0.65	
6	1.9	0.7	
8	2.2	0.9	
10	2.2	1.7	4 revolutions
12	2.4	1.7	
16	2.9	1.8	
20	3.2	1.8	

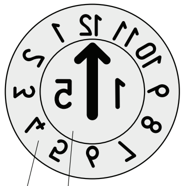


D6～20



D4・5

Two moved steel balls and six grooves are used because D4 and D5 are divided equally among twelve.



■Notes on installation of inside arrow

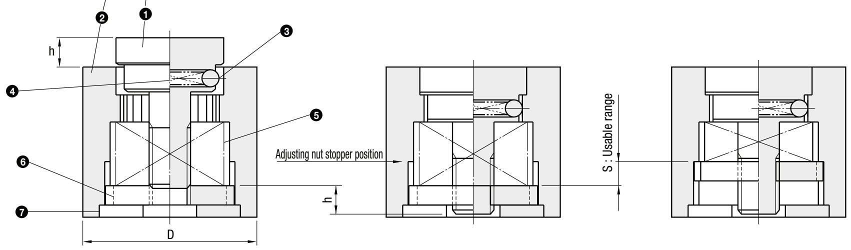
When installing the inside arrow, pay attention to the following.

① Remove the antirust agent stuck on the products after delivery.

② Clean up any grime and foreign substances by using air to blow them off the screw part of outside ring.

③ Use a special screw driver or minus screw driver to carefully fasten the inside arrow so that the threads are matched.

If a tread seizure is likely to occur during the installation of inside arrow, temporarily remove the inside arrow without fastening, then install it again. If the thread seizure occurs, the inside arrow and outside ring cannot be combined.



● How to use the inside arrow

To attach the inside arrow	To change the month indication (Arrow direction) To remove the inside arrow
Clockwise	Counterclockwise

- How to insert the inside arrow

Use a screw driver for date marked pins **DTPPN** (**P.586**) or a minus screw driver to turn the inside arrow clockwise until the adjusting nut stops.
Then reverse about a half rotation from the position it stopped.

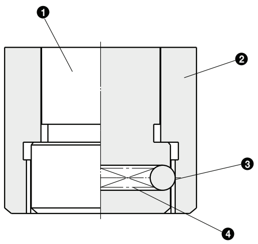
- How to use

Change the month indication by turning it counterclockwise with a screw driver for date marked pins **DTPPN** (**P.586**) or a minus screw driver.

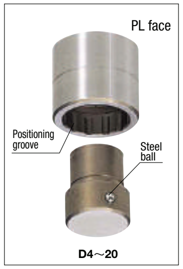
- How to take out the inside arrow

Remove the inside arrow by rotating it counterclockwise.

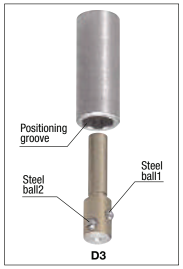
Plate side exchange type



Item	M	H
❶ Inside arrow	SUS420	50～53HRC
❷ Outside ring		
❸ Steel ball	SUS440C	58HRC～
❹ Spring	SUS304	—



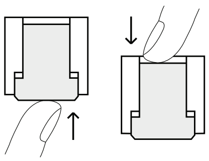
D4～20



D3

Two moved steel balls and six grooves are used because D3 is divided equally among twelve.

● How to attach/detach the inside arrow



You can easily attach/detach the inside arrow by manually pushing it as shown in the right figure. (To detach a small diameter type inside arrow, lightly push it out using a screw driver, etc.)

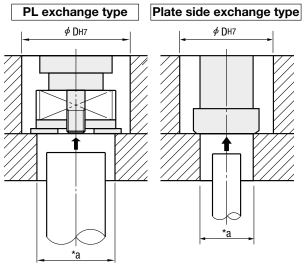
■How to mount/unmount the date marked pin

・**How to mount**

Make a reamer hole (H7 tolerance) on the plate, and press-fit the date marked pin using a wood or urethane hammer.

*1.If the hole is too small, the inside arrow may fail to rotate.

*2.Before press-fitting the date marked pin set (PL exchange type) into the die, confirm that the inside arrow is securely set in the outside ring.
If the inside arrow is protruding from the outside ring, the date marked pin set may be broken.



D	*a	
	PL exchange type	Plate side exchange type
3	—	1.6 or less
4	3.0～ 3.5	2.2 or less
5	3.0～ 4.0	2.8 or less
6	3.0～ 5.0	3.0 or less
8	3.0～ 7.0	4.6 or less
10	4.0～ 8.0	5.0 or less
12	5.0～10.0	—
16	5.0～13.0	10.5 or less
20	5.0～15.5	12.5 or less

・**How to unmount**

Make sure to prepare a hole (*a) from the plate's back beforehand. Use a round stick, etc. to drive it out from that hole as shown in the right figure.

Please note that, for date marked pin sets (PL exchange type), if the driving force is too strong, the nut will become deformed and the threads of inside arrow will be crushed, etc., resulting in failure to take out the inside arrow.

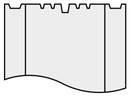
■Notes

- Characters on the finished products will be embossed normal character(Convex).
- Keep mold temperature under 150℃.
- ⊗ Cannot be used for die cast. Use Date Marked Pins for Die Cast. (**P.1291**)

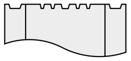
■Shape of Marks and Character Font

● Shape of marks

■**Standard arrow depth**



■**Shallow arrow depth**



The depth of the characters and the arrow mark is the same.

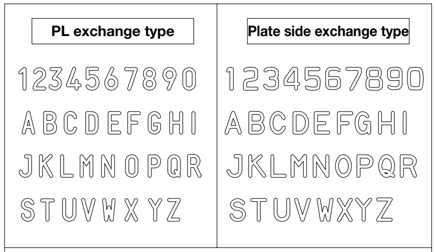
D	Depth of mark (mm)					
	PL exchange type			Plate side exchange type		
	Characters	Arrow		Characters	Arrow	
		Standard	Shallow		Standard	Shallow
3	—	—	—	0.12	0.22	—
4	0.12	0.22	0.12	0.14	0.25	0.14
5	0.14	0.25	0.14	0.16	0.30	0.16
6	0.18	0.40	0.18	0.18	0.40	0.18
8	0.20	0.40	0.20	0.20	0.40	0.20
10～20	0.22	0.50	0.22	0.22	0.50	0.22

D	Drafts for pulling (Angle, one side)		
	Characters		Arrow
	PL exchange type	Plate side exchange type	
3	—	30°	13°
4	23°	23°	
5	24°	24°	
6	22°	24°	
8	24°	24°	
10～20	25°	25°	

Date marked pin sets	Finished products
Reverse character (Concave character)	Normal character (Convex embossed character)

For the mark depth of date marked pin sets (convex character) with concave character formed on molded products, refer to **P.583**. The character font of date marked pin sets (convex character) is the same as the following.

● **Character font**



For the character font of D4・5・6 outside rings of plate side exchange type, the numbers from 1 to 9 are the character font of plate-side exchange type while the numbers from 10 to 12 are the character font of PL exchange type.

DATE MARKED PIN SETS

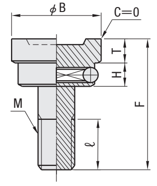
—PL EXCHANGE TYPE／STANDARD・SHALLOW　ARROW MARK TYPE—

Non JIS material definition is listed on P.1351 - 1352

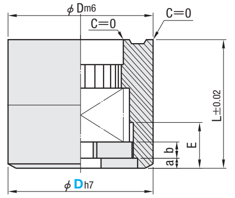
RoHS

- The inside arrow can be replaced from the PL side (internal side of the die) without removing the plate.

Inside Arrow



Outside Ring



■Inside arrow (For single items P.573)

No.	F	T	H	B	ℓ	M×P
4	7.7	1.5	3.0	2.4	2.7	M1.6×0.20
5				2.9		
6				3.7		
8	9.7	2.0	3.5	5.0	3.2	M2.3×0.25
10	11.7	2.5	4.0	6.3	4.0	M2.5×0.35
12	13.7		4.3	7.5	4.2	M3.0×0.35
16				11.0	4.8	M4.0×0.35
20	15.7	3.5	5.0	13.2	5.3	

No.	Arrow mark depth (mm)	
	Standard	Shallow
4	0.22	0.12
5	0.25	0.14
6	0.40	0.18
8	0.40	0.20
10～20	0.50	0.22

Compared to the standard type, the inside arrow is difficult to turn, so be careful not to scrape the arrow with the tip of a screwdriver. If the inside arrow is scraped, it may not be possible to remove it.

■Outside ring (For single items P.574)

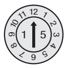
D	Dm6		Dh7		L	E	a	b
4	4	$^{+0.012}_{+0.004}$	4	$^{0}_{-0.012}$	8	2.8	1.0	1.2
5	5	$^{+0.012}_{+0.004}$	5	$^{0}_{-0.012}$		2.85		
6	6	$^{+0.012}_{+0.004}$	6	$^{0}_{-0.012}$		2.9		
8	8	$^{+0.015}_{+0.006}$	8	$^{0}_{-0.015}$	10	3.4		1.5
10	10		10		12	4.2		
12	12	$^{+0.018}_{+0.007}$	12	$^{0}_{-0.018}$	14	4.4	1.2	
16	16		16			5.0	1.4	1.8
20	20	$^{+0.021}_{+0.008}$	20	$^{0}_{-0.021}$	16	5.3	1.5	2.0

※Two balls and six grooves are used in D4 and D5.

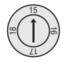
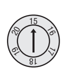
For more information P.569

M SUS420
H 50～53HRC

■Year・Month Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTBX	DTBXU
Year・Month		12 uniform divisions	DTBX DTBXU (Shallow arrow)	4	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	
				5			
				6			
				8			
				10			
				12			
				16			
				20			

■Year Switching Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTX DTXS	DTXU DTXSU
4 years type		12 uniform divisions	DTX DTXU (Shallow arrow)	4	15 for 2015～2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2019 (available from Sept.,2015) ※Days to shipe will be 5-days for the adjustment of production after November 2016. 17 for 2017～2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	
				5			
				6			
				8			
				10			
				12			
				16			
				20			
6 years type		12 uniform divisions	DTXS DTXSU (Shallow arrow)	4	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.		
				5			
				6			
				8			
				10			
				12			
				16			
				20			

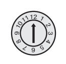
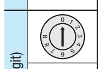
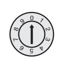
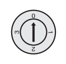
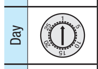
Order

Part Number	—	Year
(Year・Month) DTBX16	—	15
(Year) DTX 6	—	15
(Month) DTDX 4		
(No-marking type) DTNX 8		

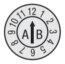
Price Quotation

Days to Ship Quotation

■Month・Day・No-marking Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1～9 DTDX DTEX DTFX DTGX DTNX	DTDXU DTEXU DTFXU DTGXU DTNXU
Month		12 uniform divisions	DTDX DTDXU (Shallow arrow)	4	Quotation	
				5		
				6		
				8		
				10		
				12		
				16		
				20		
Day (1st digit)		12 uniform divisions	DTEX DTEXU (Shallow arrow)	4		
				5		
		10 uniform divisions		6		
				8		
				10		
				12		
				16		
				20		
Day (2nd digit)		12 uniform divisions	DTFX DTFXU (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				12		
				16		
				20		
Day		31 uniform divisions	DTGX DTGXU (Shallow arrow)	16		
No-marking		12 uniform divisions	DTNX DTNXU (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				12		
				16		

■Inside Arrow Character Designation Type

Indication		Outside rings divisions	Part Number Type	D	Engraving characters (2 characters・Characters printed in blue in indications)	U/Price 1～9
2 characters・Month		12 uniform divisions	DTMBX	4	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
				5		
				6		
				8		
				10		
				12		
				16		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space).

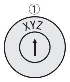
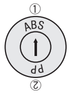
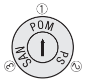
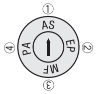
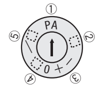
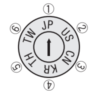
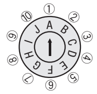
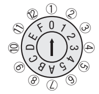
Order

Part Number	—	Characters for engraving
DTMBX8	—	AB

Price Quotation

Days to Ship Quotation

■Outside Ring Character Designation Type

Indication							
1M (1 place)	2M (2 places)	3M (3 places)	4M (4 places)	5M (5 places)	6M (6 places)	10M (10 places)	12M (12 places)
Engraving position 	Engraving position 	Engraving position 	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position 
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number			Engraving characters (1～3 characters・Characters printed in blue in indications)	U/Price 1～9							
Type	Indication	D	Engraving position ①～⑫	1M	2M	3M	4M	5M	6M	10M	12M
DTX	1M	4	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z					—	—	—	
	2M	5						—	—	—	
	3M	6									
	4M	8		Quotation							
	5M※	10									
	6M※	12									
	10M※	16									
	12M										

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

※ Not applicable to D4 and D5 of 5M, 6M and 10M.
Use ¥ for indicating ／(slash), # for — (minus), and % for ⬚(space).

●Dividing of outside rings

1M・2M・3M 4M・6M・12M	12 uniform divisions	Two moved steel balls and six grooves are used because D4 and D5 are divided equally among twelve. P.570
5M・10M	10 uniform divisions	

Order

Part Number	①Characters for engraving	②Characters for engraving	③Characters for engraving	④Characters for engraving	⑤Characters for engraving	⑥Characters for engraving	…	⑫Characters for engraving
DTX 3M 6	POM	PS	SAN					
DTX 5M 10	PA	%	#＋	0%	¥%	(No character can be designated by ⬚(space).)		
DTX 6M 16	10	20	30	40	50	60		
DTX12M 16	0	1	2	3	4	5	…	F

Days to Ship Quotation

Price Quotation

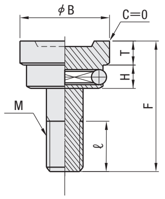
INSIDE ARROWS FOR PL EXCHANGE TYPE

—STANDARD・SHALLOW ARROW MARK TYPE—

Inside arrows for PL exchange type are the same with those of overall length adjustable type.

RoHS

Inside Arrow



No.	F	T	H	B	ℓ	M×P
4	7.7	1.5	3.0	2.4	2.7	M1.6×0.20
5				2.9		
6				3.7		
8	9.7	2.0	3.5	5.0	3.2	M2.3×0.25
10	11.7	2.5	4.0	6.3	4.0	M2.5×0.35
12	13.7		4.3	7.5	4.2	M3.0×0.35
16				11.0	4.8	M4.0×0.35
20	15.7	3.5	5.0	13.2	5.3	

No.	Arrow mark depth (mm)	
	Standard	Shallow
4	0.22	0.12
5	0.25	0.14
6	0.40	0.18
8	0.40	0.20
10~20	0.50	0.22

Compared to the standard type, the inside arrow is difficult to turn, so be careful not to scrape the arrow with the tip of a screwdriver. If the inside arrow is scraped, it may not be possible to remove it.

Inside arrows on this page are adapted for combination with outside rings of date marked pin sets on **P.571** and **P.579**, and products on **P.574** and **P.580**.

M SUS420
H 50~53HRC

■Year Type

Indication		Part Number Type	No.	Year	U/Price 1~9 DYYX	U/Price 1~9 DYYXU
Year		**DYYX** **DYYXU** (Shallow arrow)	4	**15** for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation	
			5			
			6			
			8	**16** for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.		
			10			
			12	**17** for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.		
			16			
			20			

The inside arrows are the same with those of overall length adjustable type.

■No-marking Type

Indication		Part Number Type	No.	U/Price 1~9 DNX	U/Price 1~9 DNXU
No-marking		**DNX** **DNXU** (Shallow arrow)	4	Quotation	
			5		
			6		
			8		
			10		
			12		
			16		
			20		

Order	Part Number	—	Year
	DYYX6	—	15
	DNX10		

Days to Ship **Quotation**

Price **Quotation**

■Character Designation Type

Indication		Part Number Type	No.	Engraving characters (2 characters・Characters printed in blue in indications)	U/Price 1~9
2 Characters		**DYMX**	4	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
			5		
			6		
			8		
			10		
			12		
			16		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

2 characters can be engraved on the inside arrow.

Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space).

The inside arrows are the same with those of overall length adjustable type.

Order	Part Number	—	Characters for engraving
	DYMX10	—	AB

Days to Ship **Quotation**

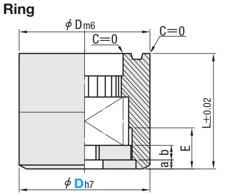
Price **Quotation**

OUTSIDE RINGS FOR PL EXCHANGE TYPE

Non JIS material definition is listed on P.1351 - 1352

RoHS

Outside Ring

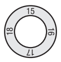
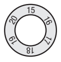


D	Dm6		Dh7		L	E	a	b
4	4	$^{+0.012}_{+0.004}$	4	$^{0}_{-0.012}$	8	2.8	1.0	1.2
5	5	$^{+0.012}_{+0.004}$	5	$^{0}_{-0.012}$		2.85		
6	6	$^{+0.012}_{+0.004}$	6	$^{0}_{-0.012}$		2.9		
8	8	$^{+0.015}_{+0.006}$	8	$^{0}_{-0.015}$	10	3.4		1.5
10	10		10		12	4.2		
12	12	$^{+0.018}_{+0.007}$	12	$^{0}_{-0.018}$	14	4.4	1.2	
16	16		16			5.0	1.4	1.8
20	20	$^{+0.021}_{+0.008}$	20	$^{0}_{-0.021}$	16	5.3	1.5	2.0

Outside rings on this page are adapted for combination with inside arrows of date marked pin sets on **P.571** and products on **P.573**

M SUS420
H 50~53HRC

■Year Switching Type

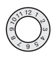
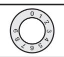
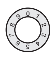
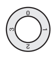
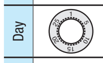
Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1~9
4 years type		12 uniform divisions	**DTX—R**	4	**15** for 2015~2018 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				5		
				6		
				8	**16** for 2016~2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10		
				12	**17** for 2017~2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
				16		
				20		
6 years type		12 uniform divisions	**DTXS—R**	4	**15** for 2015~2020 ※Days to ship will be 5-days for the adjustment of production after November 2015.	
				5		
				6		
				8	**16** for 2016~2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10		
				12	**17** for 2017~2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
				16		
				20		

Order	Part Number	—	Year
	(Year) DTX—R16	—	15
	(Month) DTDX—R16		

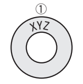
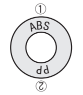
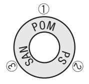
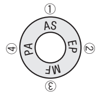
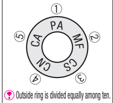
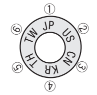
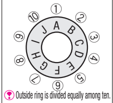
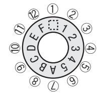
Days to Ship **Quotation**

Price **Quotation**

■Month・Day・No-marking Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1~9
Month		12 uniform divisions	**DTDX—R**	4	Quotation
				5	
				6	
				8	
				10	
				12	
				16	
				20	
Day (1st digit)		12 uniform divisions	**DTEX—R**	4	
				5	
		10 uniform divisions		6	
				8	
				10	
				12	
				16	
				20	
Day (2nd digit)		12 uniform divisions	**DTFX—R**	4	
				5	
				6	
				8	
				10	
				12	
				16	
				20	
Day		31 uniform divisions	**DTGX—R**	16	
No-marking		12 uniform divisions	**DTNX—R**	4	
				5	
				6	
				8	
				10	
				12	
				16	

■Character Designation Type

Indication							
1M (1 place)	**2M** (2 places)	**3M** (3 places)	**4M** (4 places)	**5M** (5 places)	**6M** (6 places)	**10M** (10 places)	**12M** (12 places)
Engraving position 	Engraving position 	Engraving position 	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position 
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number Type	Part Number Indication	D	Engraving characters (1~3 characters・Characters printed in blue in indications) Engraving position ①~⑫	U/Price 1~9 1M	2M	3M	4M	5M	6M	10M	12M
DTX—R	1M	4	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation				—	—	—	
	2M	5						—	—	—	
	3M	6									
	4M	8									
	5M※	10									
	6M※	12									
	10M※										
	12M	16									

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

Use ¥ for indicating ／(slash), # for —(minus), and% for ⬚(space)※ Not applicable to D4 and D5 of 5M, 6M and 10M.

Order Part Number	-	①Characters for engraving	-	②Characters for engraving	-	③Characters for engraving	-	④Characters for engraving	-	⑤Characters for engraving	-	⑥Characters for engraving	…-	⑫Characters for engraving
DTX—R 3M 6	-	POM	-	PS	-	SAN								
DTX—R 6M16	-	10	-	20	-	30	-	40	-	50	-	60		
DTX—R12M16	-	%	-	1	-	2	-	3	-	4	-	5	…-	F

Days to Ship **Quotation**

Price **Quotation**

•Dividing of outside rings

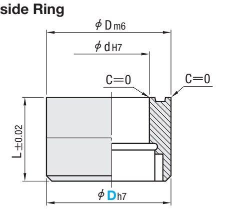
1M・2M・3M・4M 6M・12M	12 uniform divisions
5M・10M	10 uniform divisions

DATE MARKED PIN SETS

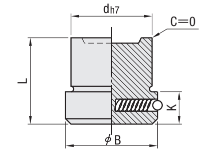
—PLATE-SIDE EXCHANGE TYPE／STANDARD ・ SHALLOW ARROW MARK TYPE—

Non JIS material definition is listed on P.1351 - 1352

Outside Ring



Inside Arrow



- The inside arrow for Month indication can be rotated from the PL side (internal side of the die), but it is replaced from plate side.

Details P.569

■Outside ring (For single items P.578)

Dm6		Dh7		dH7		L
3	+0.008 +0.002	3	0 −0.01	1.4	+0.01 0	8
4	+0.012 +0.004	4	0 −0.012	1.9		8
5		5		2.3		8
6		6		2.8		8
8	+0.015 +0.006	8	0 −0.015	4	+0.012 0	10
10		10		5		12
16	+0.018 +0.007	16	0 −0.018	10	+0.015 0	14
20	+0.021 +0.008	20	0 −0.021	12	+0.018 0	16

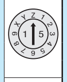
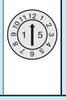
■Inside arrow (For single items P.577)

No.	dh7		B	L	K
3	1.4	0 −0.01	2	8	3
4	1.9		2.8	8	3
5	2.3		3.4	8	4
6	2.8		4	8	4
8	4	0 −0.012	5.6	10	4
10	5		6.5	12	6
16	10	0 −0.015	12	14	6
20	12	0 −0.018	14	16	6

No.	Arrow mark depth (mm)	
	Standard	Shallow
3	0.22	—
4	0.25	0.14
5	0.30	0.16
6	0.40	0.18
8	0.40	0.20
10～20	0.50	0.22

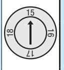
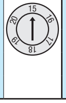
M SUS420 H 50～53HRC

■Year・Month Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTAA DTBB	U/Price 1～9 DTAAU DTBBU
Year・Month		12 uniform divisions	DTAA DTAAU (Shallow arrow) Except for D3	3	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	—
				4			
				5			
				6			
				8			
			DTBB DTBBU (Shallow arrow)	4			
				5			
				6			
				8			
				10			
				16			
				20			

The character font of DTBB4～6 is small. P.570

■Year Switching Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DT DTS	U/Price 1～9 DTU DTSU
4 years type		12 uniform divisions	DT DTU (Shallow arrow)	4	15 for 2015～2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	
				5			
				6			
				8			
				10			
				16			
				20			
6 years type		12 uniform divisions	DTS DTSU (Shallow arrow)	4	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.		
				5			
				6			
				8			
				10			
				16			

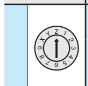
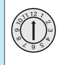
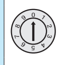
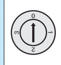
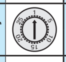
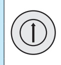
Order

Part Number	—	Year
DTBB16	—	15
DTF 8		

Days to Ship Quotation

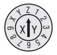
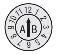
Price Quotation

■Month・Day・No-marking Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1～9 DTC・DTD DTE・DTF DTG・DTN	U/Price 1～9 DTCU・DTDU DTEU・DTFU DTGU・DTNU
Month		12 uniform divisions	DTC DTCU (Shallow arrow) Except for D3	3	Quotation	—
				4		
				5		
				6		
				8		
		12 uniform divisions	DTD DTDU (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		
Day (1st digit)		10 uniform divisions	DTE DTEU (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		
Day (2nd digit)		12 uniform divisions	DTF DTFU (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		
Day		31 uniform divisions	DTG DTGU (Shallow arrow)	16		
				20		
No-marking		12 uniform divisions	DTN DTNU (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		

The character font of DTD4～6 and DTDU6 is small. P.570

■Inside Arrow Character Designation Type

Indication		Outside rings divisions	Part Number Type	D	Engraving characters (2 characters・Characters printed in blue in indications)	U/Price 1～9
2 characters・Month		12 uniform divisions	DTMA	5	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
				6		
				8		
			DTMB	5		
				6		
				8		
				10		
				16		
				20		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space).

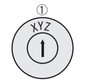
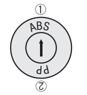
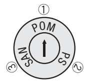
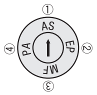
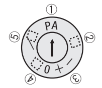
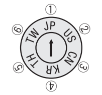
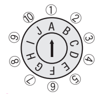
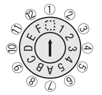
Order

Part Number	—	Characters for engraving
DTMA8	—	XY

Price Quotation

Days to Ship Quotation

■Outside Ring Character Designation Type

Indication							
1M (1 place)	2M (2 places)	3M (3 places)	4M (4 places)	5M (5 places)	6M (6 places)	10M (10 places)	12M (12 places)
Engraving position 	Engraving position 	Engraving position 	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position 
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number Type	Indication	D	Engraving characters (1～3 characters・Characters printed in blue in indications) Engraving position ①～⑫	U/Price 1～9 1M	2M	3M	4M	5M	6M	10M	12M
DT	1M 2M 3M 4M 5M※ 6M※ 10M 12M	5	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation				—	—		
		6									
		8									
		10									
		16									
		20									

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

※ DT5M/DT6M not available for D5.
Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚ (space).

●Dividing of outside rings

1M・2M・3M 4M・6M・12M	12 uniform divisions
5M・10M	10 uniform divisions

Order

Part Number	-	①Characters for engraving	-	②Characters for engraving	-	③Characters for engraving	-	④Characters for engraving	-	⑤Characters for engraving	-	⑥Characters for engraving	…	-	⑫Characters for engraving
DT 3M 6	-	POM	-	PS	-	SAN									
DT 5M 10	-	PA	-	%	-	#＋	-	0%	-	\%		(No character can be designated by ⬚ (space).)			
DT 6M 20	-	10	-	20	-	30	-	40	-	50	-	60			
DT12M 20	-	%	-	1	-	2	-	3	-	4	-	5	…	-	F

Days to Ship Quotation

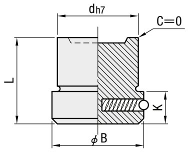
Price Quotation

INSIDE ARROWS FOR PLATE-SIDE EXCHANGE TYPE

—STANDARD・SHALLOW ARROW MARK TYPE—

RoHS

Inside Arrow



No.	dh7		B	L	K
3	1.4	0 −0.01	2	8	3
4	1.9		2.8		
5	2.3		3.4		4
6	2.8		4		
8	4	0 −0.012	5.6	10	
10	5		6.5	12	6
16	10	0 −0.018	12	14	
20	12	0 −0.015	14	16	

No.	Arrow mark depth (mm)	
	Standard	Shallow
3	0.22	—
4	0.25	0.14
5	0.30	0.16
6	0.40	0.18
8	0.40	0.20
10~20	0.50	0.22

Details P.570

Inside arrows on this page are adapted for combination with outside rings of date marked pin sets on **P.575・581**, and products on **P.578・582**.

M SUS420
H 50~53HRC

■Year Type

Indication		Part Number		Year	U/Price1~9	
		Type	No.		DYY	DYYU
Year		**DYY** **DYYU** (Shallow arrow) Except for No.3	3	**15** for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015. **16** for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. **17** for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	—
			4			
			5			
			6			
			8			
			10			
			16			
			20			

■ No-marking Type

Indication		Part Number		U/Price1~9	
		Type	No.	DN	DNU
No-marking		**DN** **DNU** (Shallow arrow) Except for No.3	3	Quotation	—
			4		
			5		
			6		
			8		
			10		
			16		
			20		

Order

Part Number	—	Year
(Year) DYY6	—	15
(No-marking) DN10		

Days to Ship Quotation

Price Quotation

■Character Designation Type

Indication		Part Number		Engraving characters (2 characters・Characters printed in blue in indications)	U/Price 1~9
		Type	No.		
2 characters		**DYM**	5	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
			6		
			8		
			10		
			16		
			20		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

2 characters can be engraved on the inside arrow.

Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space).

Order

Part Number	—	Characters for engraving
DYM10	—	AB

Days to Ship Quotation

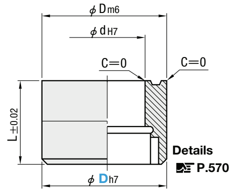
Price Quotation

OUTSIDE RINGS FOR PLATE-SIDE EXCHANGE TYPE

Non JIS material definition is listed on P.1351 - 1352

RoHS

Outside Ring



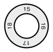
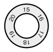
Details P.570

Dm6		Dh7		dH7		L
3	+0.008 +0.002	3	0 −0.01	1.4	+0.01 0	8
4	+0.012 +0.004	4	0 −0.012	1.9		8
5		5		2.3		8
6		6		2.8		8
8	+0.015 +0.006	8	0 −0.015	4	+0.012 0	10
10		10		5		12
16	+0.018 +0.007	16	0 −0.018	10	+0.015 0	14
20	+0.021 +0.008	20	0 −0.021	12	+0.018 0	16

Outside rings on this page are adapted for combination with inside arrows of date marked pin sets on **P.575,** and products on **P.577**.

M SUS420
H 50~53HRC

■Year Switching Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
4 years type		12 uniform divisions	**DT—R**	4	**15** for 2015~2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. **16** for 2016~2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. **17** for 2017~2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation
				5		
				6		
				8		
				10		
				16		
				20		
6 years type		12 uniform divisions	**DTS—R**	4	**15** for 2015~2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. **16** for 2016~2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. **17** for 2017~2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
				5		
				6		
				8		
				10		
				16		

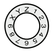
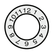
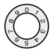
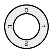
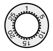
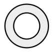
Order

Part Number	—	Year
(Year) DT —R16	—	15
(Month) DTD—R10		

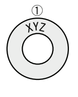
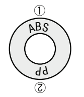
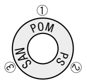
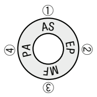
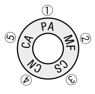
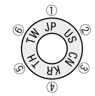
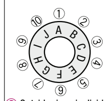
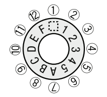
Days to Ship Quotation

Price Quotation

■Month・Day・No-marking Type

Indication		Outside rings divisions	Part Number		U/Price
			Type	D	1~9
Month		12 uniform divisions	**DTC—R**	3 4 5 6 8	Quotation
		12 uniform divisions	**DTD—R**	4 5 6 8 10 16 20	
Day (1st digit)		10 uniform divisions	**DTE—R**	4 5 6 8 10 16 20	
Day (2nd digit)		12 uniform divisions	**DTF—R**	4 5 6 8 10 16 20	
Day		31 uniform divisions	**DTG—R**	16 20	
No-marking		12 uniform divisions	**DTN—R**	4 5 6 8 10 16 20	

■Character Designation Type

Indication							
1M (1 place)	**2M** (2 places)	**3M** (3 places)	**4M** (4 places)	**5M** (5 places)	**6M** (6 places)	**10M** (10 places)	**12M** (12 places)
Engraving position 	Engraving position 	Engraving position 	Engraving position 	Engraving position Outside ring is divided equally among ten.	Engraving position 	Engraving position Outside rings is divided equally among ten.	Engraving position 
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number			Engraving characters (1~3 characters・Characters printed in blue in indications)	U/Price 1~9							
Type	Indication	D	Engraving position ①~⑫	1M	2M	3M	4M	5M	6M	10M	12M
DT—R	1M 2M 3M 4M 5M※ 6M※ 10M※ 12M	5	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation				—	—		
		6									
		8									
		10									
		16									
		20									

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

※ Not applicable to D5 of DT—R5M and DT—R6M. Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space).

Order

Part Number	–	①Characters for engraving	–	②Characters for engraving	–	③Characters for engraving	–	④Characters for engraving	–	⑤Characters for engraving	–	⑥Characters for engraving	…–	⑫Characters for engraving
DT—R 3M 6	–	POM	–	PS	–	SAN								
DT—R 6M 20	–	JP	–	US	–	CN	–	KR	–	TH	–	TW		
DT—R12M 16	–	%	–	1	–	2	–	3	–	4	–	5	…–	F

●Dividing of outside rings

1M・2M・3M・4M 6M・12M	12 uniform divisions
5M・10M	10 uniform divisions

Days to Ship Quotation

Price Quotation

DATE MARKED PIN SETS

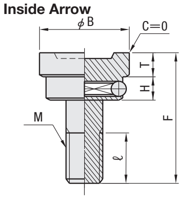
—PL EXCHANGE・OUTER CORNER TAPERED TYPE—

Outer Corner Tapered

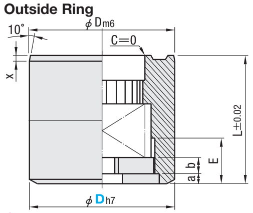
RoHS

- The inside arrow can be replaced from the PL side (internal side of the die) without removing the plate.

Inside Arrow



Outside Ring



ⓘ See below for the relationship between taper height and mark depth.

■Inside arrow (For single items ☞ P.573)

No.	F	T	H	B	ℓ	M×P
4	7.7	1.5	3.0	2.4	2.7	M1.6×0.20
5	7.7	1.5	3.0	2.9	2.7	M1.6×0.20
6	7.7	1.5	3.0	3.7	2.7	M1.6×0.20
8	9.7	2.0	3.5	5.0	3.2	M2.3×0.25
10	11.7	2.5	4.0	6.3	4.0	M2.5×0.35
12	13.7		4.3	7.5	4.2	M3.0×0.35
16				11.0	4.8	M4.0×0.35

No.	Arrow mark depth (mm)	
	Standard	Shallow ⓘ
4	0.22	0.12
5	0.25	0.14
6	0.4	0.18
8	0.4	0.20
10～16	0.5	0.22

ⓘ Compared to the standard type, the inside arrow is difficult to turn, so be careful not to scrape the arrow with the tip of a screwdriver. If the inside arrow is scraped, it may not be possible to remove it.

■Outside ring (For single items ☞ Right page)

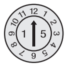
D	Dm6		Dh7		L	E	a	b	Taper height x
4	4	+0.012 +0.004	4	0 −0.012	8	2.8	1.0	1.2	0.4
5	5	+0.012 +0.004	5	0 −0.012	8	2.85	1.0	1.2	0.4
6	6	+0.012 +0.004	6	0 −0.012	8	2.9	1.0	1.2	0.5
8	8	+0.015 +0.006	8	0 −0.015	10	3.4		1.5	0.5
10	10		10		12	4.2			0.5
12	12	+0.018 +0.007	12	0 −0.018	14	4.4	1.2	1.8	0.5
16	16		16			5.0	1.4		0.5

※Two balls and six grooves are used in D4 and D5.

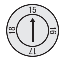
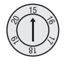
For more information ☞ P.569

M SUS420
H 50～53HRC

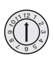
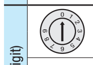
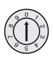
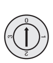
■Year・Month Type

Indication	Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTBXT	DTBXUT
Year・Month 	12 uniform divisions	**DTBXT** **DTBXUT** (Shallow arrow)	4	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	
			5			
			6			
			8			
			10			
			12			
			16			

■Year Switching Type

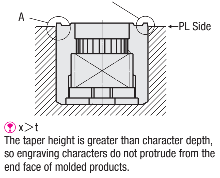
Indication	Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTXT DTXST	DTXUT DTXSUT
4 years type 	12 uniform divisions	**DTXT** **DTXUT** (Shallow arrow)	4	15 for 2015～2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	
			5			
			6			
			8			
			10			
			12			
			16			
6 years type 	12 uniform divisions	**DTXST** **DTXSUT** (Shallow arrow)	4	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.		
			5			
			6			
			8			
			10			
			12			
			16			

■Month・Day・No-marking Type

Indication	Outside rings divisions	Part Number Type	D	U/Price 1～9 DTDXT DTEXT DTFXT	DTDXUT DTEXUT DTFXUT
Month 	12 uniform divisions	**DTDXT** **DTDXUT** (Shallow arrow)	4		
			5		
			6		
			8		
			10		
			12		
			16		
Day (1st digit) 	12 uniform divisions	**DTEXT** **DTEXUT** (Shallow arrow)	4	Quotation	
			5		
	10 uniform divisions		6		
			8		
			10		
			12		
			16		
Day (2nd digit) 	12 uniform divisions	**DTFXT** **DTFXUT** (Shallow arrow)	4		
			5		
			6		
			8		
			10		
			12		
			16		

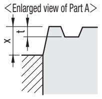
■Features of outer corner tapered type

When used by thrusting out the date marked pin sets from PL side, the mold-release performance of tapered section of outer corner is enhanced, and resin curling at the edge of outer corner is prevented.



D	Taper height x	Mark depth t
4	0.4	0.12
5	0.4	0.14
6	0.5	0.18
8	0.5	0.20
10	0.5	0.22
12	0.5	0.22
16	0.5	0.22

<Enlarged view of Part A>



ⓘ x>t
The taper height is greater than character depth, so engraving characters do not protrude from the end face of molded products.

Order

Part Number	—	Year
(Year・Month) DTBXT16	—	15
(Year) DTXT 6	—	15
(Month) DTDXT 4		

Days to Ship Quotation

Price Quotation

OUTSIDE RINGS FOR PL EXCHANGE TYPE・OUTER CORNER TAPERED TYPE

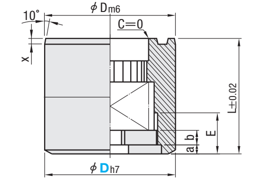
Outer Corner Tapered

ⓘ Non JIS material definition is listed on P.1351 - 1352

ⓘ Outside rings on this page are adapted for combination with the inside arrows on **P.573**.

RoHS

Outside Ring

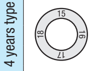
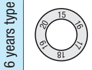


ⓘ For the relationship between taper height and mark depth, refer to the features of outer corner tapered type on the left page.

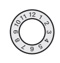
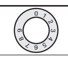
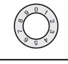
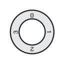
D	Dm6		Dh7		L	E	a	b	Taper height x
4	4	+0.012 +0.004	4	0 −0.012	8	2.8	1.0	1.2	0.4
5	5	+0.012 +0.004	5	0 −0.012	8	2.85	1.0	1.2	0.4
6	6	+0.012 +0.004	6	0 −0.012	8	2.9	1.0	1.2	0.5
8	8	+0.015 +0.006	8	0 −0.015	10	3.4		1.5	0.5
10	10		10		12	4.2			0.5
12	12	+0.018 +0.007	12	0 −0.018	14	4.4	1.2	1.5	0.5
16	16		16			5.0	1.4	1.8	0.5

M SUS420
H 50～53HRC

■Year Switching Type

Indication	Outside rings divisions	Part Number Type	D	Year	U/Price 1～9
4 years type 	12 uniform divisions	**DTX−RT**	4	15 for 2015～2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation
			5		
			6		
			8		
			10		
			12		
			16		
6 years type 	12 uniform divisions	**DTXS−RT**	4	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
			5		
			6		
			8		
			10		
			12		
			16		

■Month・Day・No-marking Type

Indication	Outside rings divisions	Part Number Type	D	U/Price 1～9
Month 	12 uniform divisions	**DTDX−RT**	4	
			5	
			6	
			8	
			10	
			12	
			16	Quotation
Day (1st digit) 	12 uniform divisions	**DTEX−RT**	4	
			5	
	10 uniform divisions		6	
			8	
			10	
			12	
			16	
Day (2nd digit) 	12 uniform divisions	**DTFX−RT**	4	
			5	
			6	
			8	
			10	
			12	
			16	

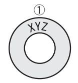
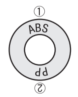
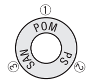
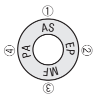
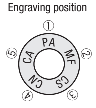
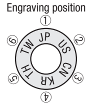
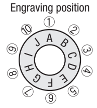
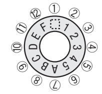
Order

Part Number	—	Year
(Year)DTX−RT16	—	15
(Month)DTDX−RT16		

Days to Ship Quotation

Price Quotation

■Character Designation Type

Indication							
1M (1 place)	2M (2 places)	3M (3 places)	4M (4 places)	5M (5 places)	6M (6 places)	10M (10 places)	12M (12 places)
Engraving position 	Engraving position 	Engraving position 	Engraving position 	Engraving position  ⓘ Outside ring is divided equally among ten.	Engraving position 	Engraving position  ⓘ Outside ring is divided equally among ten.	Engraving position 
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number Type	Indication	D	U/Price 1～9 1M	2M	3M	4M	5M	6M	10M	12M
DTX−RT	1M	4					—	—	—	
	2M	5					—	—	—	
	3M	6				Quotation				
	4M	8								
	5M※	10								
	6M※	12								
	10M※	16								
	12M									

Engraving characters (1～3 characters・Characters printed in blue in indications)

Engraving position ①～⑫

1	2	3	4	5
6	7	8	9	0
A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y
Z				

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

ⓘ Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space). ※ Not applicable to D4 and D5 of 5M, 6M and 10M.

Order

Part Number	–	①Characters for engraving	–	②Characters for engraving	–	③Characters for engraving	–	④Characters for engraving	–	⑤Characters for engraving	–	⑥Characters for engraving	....–	⑫Characters for engraving
DTX−RT 3M 6	–	POM	–	PS	–	SAN								
DTX−RT 6M16	–	10	–	20	–	30	–	40	–	50	–	60		
DTX−RT12M16	–	%	–	1	–	2	–	3	–	4	–	5	....–	F

•Dividing of outside rings

1M・2M・3M・4M 6M・12M	12 uniform divisions
5M・10M	10 uniform divisions

Days to Ship Quotation

Price Quotation

DATE MARKED PIN SETS

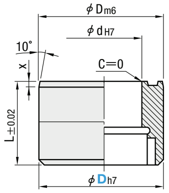
—PLATE-SIDE EXCHANGE · OUTER CORNER TAPERED TYPE—

Outer Corner Tapered

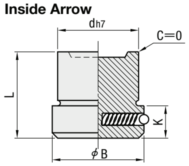
RoHS

- The inside arrow for Month indication can be rotated from the PL side (internal side of the die), but it is replaced from plate side.

Outside Ring



Inside Arrow



For more information P.569

■Outside ring (For single items Right page)

Dm6		Dh7		dH7		L	Taper height x
3	+0.008 +0.002	3	0 −0.01	1.4	+0.01 0	8	0.4
4	+0.012 +0.004	4	0 −0.012	1.9		8	0.4
5		5		2.3		8	0.4
6		6		2.8		8	0.5
8	+0.015 +0.006	8	0 −0.015	4	+0.012 0	10	0.5
10		10		5		12	0.5
16	+0.018 +0.007	16	0 −0.018	10	+0.015 0	14	0.5
20	+0.021 +0.008	20	0 −0.021	12	+0.018 0	16	0.5

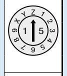
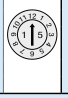
■Inside arrow (For single items P.577)

No.	dh7		B	L	K
3	1.4	0 −0.01	2	8	3
4	1.9		2.8	8	3
5	2.3		3.4	8	4
6	2.8		4	8	4
8	4	0 −0.012	5.6	10	4
10	5		6.5	12	6
16	10	0 −0.015	12	14	6
20	12	0 −0.018	14	16	6

No.	Arrow mark depth (mm) Standard	Arrow mark depth (mm) Shallow
3	0.22	—
4	0.25	0.14
5	0.3	0.16
6	0.4	0.18
8	0.4	0.20
10～20	0.5	0.22

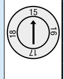
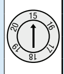
See below for the relationship between taper height and mark depth. **M** SUS420 **H** 50～53HRC

■Year · Month Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTAAT DTBBT	U/Price 1～9 DTAAUT DTBBUT
Year · Month		12 uniform divisions	DTAAT DTAAUT (Shallow arrow) Except for D3	3	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	—
				4			Quotation
				5			
				6			
				8			
			DTBBT DTBBUT (Shallow arrow)	4			
				5			
				6			
				8			
				10			
				16			
				20			

The character font of DTBBT4～6 is small. P.570

■Year Switching Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9 DTT DTST	U/Price 1～9 DTUT DTSUT
4 years type		12 uniform divisions	DTT DTUT (Shallow arrow)	4	15 for 2015～2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation	Quotation
				5			
				6			
				8			
				10			
				16			
				20			
6 years type		12 uniform divisions	DTST DTSUT (Shallow arrow)	4	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.		
				5			
				6			
				8			
				10			
				16			

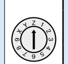
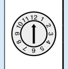
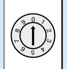
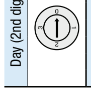
Order

Part Number	—	Year
DTBBT16	—	15
DTFT 8		

Days to Ship Quotation

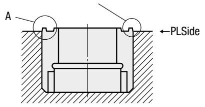
Price Quotation

■Month · Day · No-marking Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1～9 DTCT · DTDT DTET · DTFT	U/Price 1～9 DTCUT · DTDUT DTEUT · DTFUT
Month		12 uniform divisions	DTCT DTCUT (Shallow arrow) Except for D3	3	Quotation	—
				4		Quotation
				5		
				6		
				8		
		12 uniform divisions	DTDT DTDUT (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		
Day (1st digit)		10 uniform divisions	DTET DTEUT (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		
Day (2nd digit)		12 uniform divisions	DTFT DTFUT (Shallow arrow)	4		
				5		
				6		
				8		
				10		
				16		
				20		

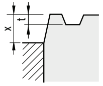
■Features of outer corner tapered type

When used by thrusting out the date marked pin sets from PL side, the mold-release performance of tapered section of outer corner is enhanced, and resin curling at the edge of outer corner is prevented.



D	Taper height x	Mark depth t
3	0.4	0.12
4	0.4	0.14
5	0.4	0.16
6	0.5	0.18
8	0.5	0.20
10	0.5	0.22
16	0.5	0.22
20	0.5	0.22

＜Enlarged view of Part A＞



x＞t
The taper height is greater than character depth, so engraving characters do not protrude from the end face of molded products.

OUTSIDE RINGS FOR PLATE-SIDE EXCHANGE TYPE · OUTER CORNER TAPERED TYPE

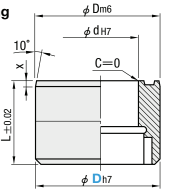
Outer Corner Tapered

Non JIS material definition is listed on P.1351 - 1352

Outside rings on this page are adapted for combination with the inside arrows on **P.577**.

RoHS

Outside Ring

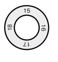
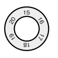


For more information P.570

Dm6		Dh7		dH7		L	Taper height x
3	+0.008 +0.002	3	0 −0.01	1.4	+0.01 0	8	0.4
4	+0.012 +0.004	4	0 −0.012	1.9		8	0.4
5		5		2.3		8	0.4
6		6		2.8		8	0.5
8	+0.015 +0.006	8	0 −0.015	4	+0.012 0	10	0.5
10		10		5		12	0.5
16	+0.018 +0.007	16	0 −0.018	10	+0.015 0	14	0.5
20	+0.021 +0.008	20	0 −0.021	12	+0.018 0	16	0.5

For the relationship between taper height and mark depth, refer to the features of outer corner tapered type on the left page. **M** SUS420 **H** 50～53HRC

■Year Switching Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9
4 years type		12 uniform divisions	DT—RT	4	15 for 2015～2018 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation
				5		
				6		
				8		
				10		
				16		
				20		
6 years type		12 uniform divisions	DTS—RT	4	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
				5		
				6		
				8		
				10		
				16		

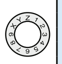
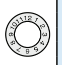
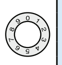
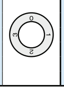
Order

Part Number	—	Year
(Year)DT —RT16	—	15
(Month)DTD—RT10		

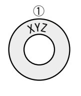
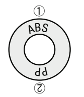
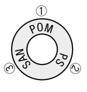
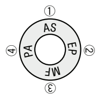
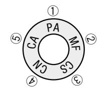
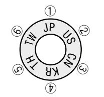
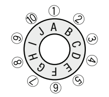
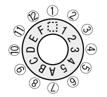
Days to Ship Quotation

Price Quotation

■Month · Day · No-marking Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1～9
Month		12 uniform divisions	DTC—RT	3	Quotation
				4	
				5	
				6	
				8	
		12 uniform divisions	DTD—RT	4	
				5	
				6	
				8	
				10	
				16	
				20	
Day (1st digit)		10 uniform divisions	DTE—RT	4	
				5	
				6	
				8	
				10	
				16	
				20	
Day (2nd digit)		12 uniform divisions	DTF—RT	4	
				5	
				6	
				8	
				10	
				16	
				20	

■Character Designation Type

Indication 1M (1 place)	2M (2 places)	3M (3 places)	4M (4 places)	5M (5 places)	6M (6 places)	10M (10 places)	12M (12 places)
Engraving position	Engraving position	Engraving position	Engraving position	Engraving position	Engraving position	Engraving position	Engraving position
							
				Outside ring is divided equally among ten.		Outside ring is divided equally among ten.	
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number Type	Indication	D	Engraving characters (1～3 characters · Characters printed in blue in indications) Engraving position ①～⑫	U/Price 1～9 1M	2M	3M	4M	5M	6M	10M	12M
DT—RT	1M 2M 3M 4M 5M※ 6M※ 10M※ 12M	5 6 8 10 16 20	1 2 3 4 5 6 7 8 9 0 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation				—	—		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

※ Not applicable to D5 of DT—RT5M and DT—RT6M. Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚(space).

Order

Part Number	①Characters for engraving	②Characters for engraving	③Characters for engraving	④Characters for engraving	⑤Characters for engraving	⑥Characters for engraving	…	⑫Characters for engraving
DT—RT 3M 6	POM	PS	SAN					
DT—RT 6M 20	JP	US	CN	KR	TH	TW		
DT—RT12M 16	%	1	2	3	4	5	…	F

•Dividing of outside rings

1M · 2M · 3M · 4M 6M · 12M	12 uniform divisions
5M · 10M	10 uniform divisions

Days to Ship Quotation

Price Quotation

DATE MARKED PIN SETS

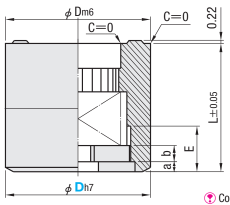
—PL EXCHANGE・CONVEX CHARACTER TYPE—

Note that inside arrows and outside rings (PL exchange・convex character type) on this page are not interchangeable with products on other pages.

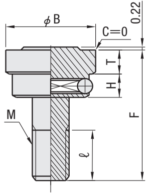
RoHS

- The inside arrow can be replaced from the PL side (internal side of the die) without removing the plate.

Outside Ring



Inside Arrow



For more information P.569

Compared to the standard type, the inside arrow is difficult to turn, so be careful not to scrape the arrow with the tip of a screwdriver. If the inside arrow is scraped, it may not be possible to remove it.

■Outside ring

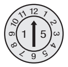
D	Dm6		Dh7		L	E	a	b
6	6	${}^{+0.012}_{+0.004}$	6	${}^{0}_{-0.012}$	8	2.9	1.0	1.2
8	8	${}^{+0.015}_{+0.006}$	8	${}^{0}_{-0.015}$	10	3.4		1.5
10	10		10		12	4.2		

■Inside arrow

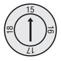
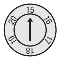
No.	F	T	H	B	ℓ	M×P
6	7.7	1.5	3.0	3.7	2.7	M1.6×0.20
8	9.7	2.0	3.5	5.0	3.2	M2.3×0.25
10	11.7	2.5	4.0	6.3	4.0	M2.5×0.35

M SUS420
H 50~53HRC

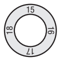
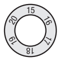
■Date Marked Pin Sets Year・Month Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
Year・Month		12 uniform divisions	DTBXC	6	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				8	16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

■Date Marked Pin Sets Year Switching Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
4 years type		12 uniform divisions	DTXC	6	15 for 2015~2018 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				8	16 for 2016~2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
6 years type		12 uniform divisions	DTXSC	6	15 for 2015~2020 ※Days to ship will be 5-days for the adjustment of production after November 2015.	
				8	16 for 2016~2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

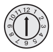
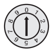
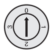
■Outside Ring Year Switching Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
4 years type		12 uniform divisions	DTX—RC	6	15 for 2015~2018 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				8	16 for 2016~2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
6 years type		12 uniform divisions	DTXS—RC	6	15 for 2015~2020 ※Days to ship will be 5-days for the adjustment of production after November 2015.	
				8	16 for 2016~2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

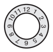
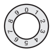
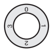
■Inside Arrow Year Type

Indication		Part Number		Year	U/Price
		Type	No.		1~9
Year		DYYXC	6	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
			8	16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
			10	17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

■Date Marked Pin Sets Month・Day Type

Indication		Outside rings divisions	Part Number		U/Price
			Type	D	1~9
Month		12 uniform divisions	DTDXC	6	Quotation
				8	
				10	
Day (1st digit)		10 uniform divisions	DTEXC	6	
				8	
				10	
Day (2nd digit)		12 uniform divisions	DTFXC	6	
				8	
				10	

■Outside Ring Month・Day Type

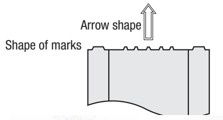
Indication		Outside rings divisions	Part Number		U/Price
			Type	D	1~9
Month		12 uniform divisions	DTDX—RC	6	Quotation
				8	
				10	
Day (1st digit)		10 uniform divisions	DTEX—RC	6	
				8	
				10	
Day (2nd digit)		12 uniform divisions	DTFX—RC	6	
				8	
				10	

■Inside Arrow No-marking Type

Indication		Part Number		U/Price
		Type	No.	1~9
No-marking		DNXC	6	Quotation
			8	
			10	

■Features of Date Marked Pin Sets Convex Character Type

Concave characters are formed for molded products, so engraving characters do not protrude from the end face of molded products.



D	Mark height (mm)		Drafts for pulling (Angle, one side)	
	Characters	Arrow	Characters	Arrow
6	0.22	0.22	20°	13°
8				
10				

PL exchange type is the same with plate-side exchange type.

■Order・Lead time Right page

DATE MARKED PIN SETS

—PLATE-SIDE EXCHANGE・CONVEX CHARACTER TYPE—

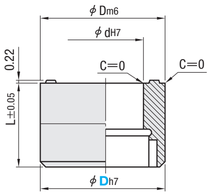
Non JIS material definition is listed on P.1351 - 1352

Note that inside arrows and outside rings (Plate side exchange・convex character type) on this page are not interchangeable with products on other pages.

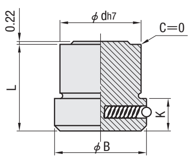
RoHS

- The inside arrow for Month indication can be rotated from the PL side (internal side of the die), but it is replaced from plate side.

Outside Ring



Inside Arrow



For more information P.569

■Outside ring

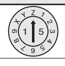
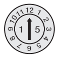
Dm6		Dh7		dH7		L
6	${}^{+0.012}_{+0.004}$	6	${}^{0}_{-0.012}$	2.8	${}^{+0.01}_{0}$	8
8	${}^{+0.015}_{+0.006}$	8	${}^{0}_{-0.015}$	4	${}^{+0.012}_{0}$	10
10		10		5		12

■Inside arrow

No.	dh7		B	L	K
6	2.8	${}^{0}_{-0.01}$	4	8	4
8	4	${}^{0}_{-0.012}$	5.6	10	4
10	5		6.5	12	6

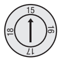
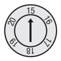
M SUS420 **H** 50~53HRC

■Date Marked Pin Sets Year・Month Type

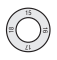
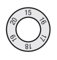
Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
Year・Month		12 uniform divisions	DTAAC	6	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				8	16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
			DTBBC	6		
				8	17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
				10		

The character font of DTBBC6 is small. P.570

■Date Marked Pin Sets Year Switching Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
4 years type		12 uniform divisions	DTHC	6	15 for 2015~2018 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				8	16 for 2016~2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
6 years type		12 uniform divisions	DTSC	6	15 for 2015~2020 ※Days to ship will be 5-days for the adjustment of production after November 2015.	
				8	16 for 2016~2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

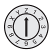
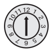
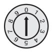
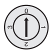
■Outside Ring Year Switching Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1~9
4 years type		12 uniform divisions	DTH—RC	6	15 for 2015~2018 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
				8	16 for 2016~2019 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2020 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	
6 years type		12 uniform divisions	DTS—RC	6	15 for 2015~2020 ※Days to ship will be 5-days for the adjustment of production after November 2015.	
				8	16 for 2016~2021 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
				10	17 for 2017~2022 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

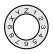
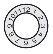
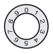
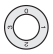
■Inside Arrow Year Type

Indication		Part Number		Year	U/Price
		Type	No.		1~9
Year		DYYC	6	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015.	Quotation
			8	16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016.	
			10	17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	

■Date Marked Pin Sets Month・Day Type

Indication		Outside rings divisions	Part Number		U/Price
			Type	D	1~9
Month		12 uniform divisions	DTCC	6	Quotation
				8	
		12 uniform divisions	DTDC	6	
				8	
				10	
Day (1st digit)		10 uniform divisions	DTEC	6	
				8	
				10	
Day (2nd digit)		12 uniform divisions	DTFC	6	
				8	
				10	

■Outside Ring Month・Day Type

Indication		Outside rings divisions	Part Number		U/Price
			Type	D	1~9
Month		12 uniform divisions	DTC—RC	6	Quotation
				8	
		12 uniform divisions	DTD—RC	6	
				8	
				10	
Day (1st digit)		10 uniform divisions	DTE—RC	6	
				8	
				10	
Day (2nd digit)		12 uniform divisions	DTF—RC	6	
				8	
				10	

■Inside Arrow No-marking Type

Indication		Part Number		U/Price
		Type	No.	1~9
No-marking		DNC	6	Quotation
			8	
			10	

Order

Part Number	—	Year
(Year・Month) DTBXC6	—	15
(Year) DTXC 6	—	15
(Month) DTDXC8		
(No-marking) DNXC 8		

Days to Ship Quotation

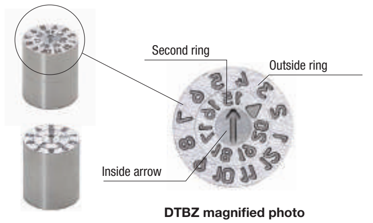
Price Quotation

GUIDE FOR DATE MARKED PIN SETS

—DOUBLE RING TYPE—

■Features of Date Marked Pin Sets

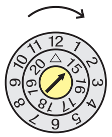
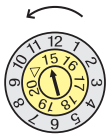
- A date mark double ring type consists of an inside arrow and a double ring structure.
  A year/month changeover type consists of a year indication for 6 years and a month indication. A date changeover type can indicate both the 2nd digit and the 1st digit. The year/month changeover type can be used for six years, thus eliminating the trouble of replacing the conventional inside arrow, and also helping to reduce costs.
- Positioning (arrow position) is done by using a stopper mechanism employing a steel ball, so compared to an O-ring the positioning accuracy is improved, and also durability with respect to gas and high temperature generated during machining is excellent.



DTBZ magnified photo

■Structure and Usage

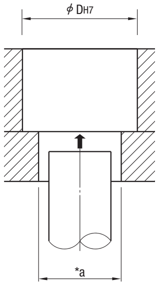
● Method of changing over the indication

Changing the year indication	Changing the month indication
Turn clockwise	**Turn counterclockwise**
	
● When the center part is turned clockwise, only the inside arrow rotates, enables the year to be changed. ● In the case of a date changeover type, turning the center part clockwise causes the 2nd digit to be changed.	● Turning the center part counterclockwise causes, both the inside arrow and the second ring to turn simultaneously, enabling the month to be changed. ● In the case of a date changeover type, turning the center part counterclockwise enables the 1st digit to be changed.

■How to mount/unmount the date marked pin

Make a reamer hole (H7 tolerance) on the plate, and press-fit the date marked pin using a wood or urethane hammer. To remove the date marked pin, make sure to prepare a hole (*a) from the plate's back beforehand. Use a round stick, etc. to drive it out from that hole as shown in the right figure.

D	*a
6	4.0～5.0
8	6.0～7.0
10	6.0～8.5
16	11.0～14.0



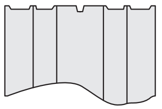
■Notes

- Characters on the finished products will be embossed normal character(Convex).
- Keep mold temperature under 150℃ .
- Please note inside arrow can not exchange.
- ⊗ Cannot be used for die cast. Use Date Marked Pins for Die Cast. (**P.1291**)

■Shape of Marks and Character Font

Date Marked Pin Sets	Finished products
Reverse character (Concave character)	Normal character (Convex embossed character)

● Shape of marks



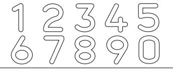
D	Depth of mark (mm)	
	Characters	Arrow
6	0.15	0.3
8	0.18	
10	0.22	0.4
16		

D	Drafts for pulling (Angle, one side)	
	Characters Double ring type	Arrow
6	25°	13°
8		
10		
16		

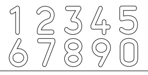
● Character font

Year・Month switching type Outside Ring

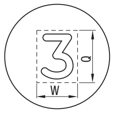
Date switching type



Year・Month switching type Second ring



● Width and height Character font

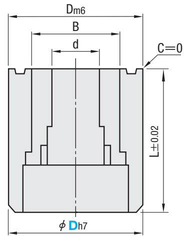


Indication	D	Second ring		Outside Ring	
		Q	W	Q	W
Year・Month switching type	6	0.6	0.3	0.6	0.4
	8	0.8	0.45	0.8	0.55
	10	1.05	0.7	1.2	0.9
	16	1.85	1.2	2.1	1.5
Date switching type	6	0.6	0.4	0.6	0.4
	8	0.8	0.45	0.8	0.55
	10	1.05	0.8	1.2	0.9
	16	1.85	1.35	2.1	1.5

DATE MARKED PIN SETS／SCREWDRIVERS FOR DATE MARKED PIN SET

—DOUBLE RING TYPE—

RoHS

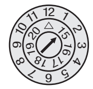


D	Dm6	Dh7	L	B	d
6	+0.012 +0.004	0 −0.012	10	3.8	1.8
8	+0.015 +0.006	0 −0.015		5.3	2.5
10	+0.015 +0.006	0 −0.015	12	6.4	3.2
16	+0.018 +0.007	0 −0.018	14	10.2	5.0

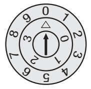
For more information **left page**

M SUS420
H 50～53HRC

■Year・Month Switching Type

Indication		Outside rings divisions	Part Number		Year	U/Price
			Type	D		1～9
Year・Month		12 uniform divisions	DTBZ	6	15 for 2015～2020 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016～2021 (available from September, 2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017～2022 (available from September, 2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation
				8		
				10		
				16		

■Day Switching Type (2nd digit・1st digit)

Indication		Outside rings divisions	Part Number		U/Price
			Type	D	1～9
Day		10 uniform divisions	DTEZ	6	Quotation
				8	
				10	
				16	

Order

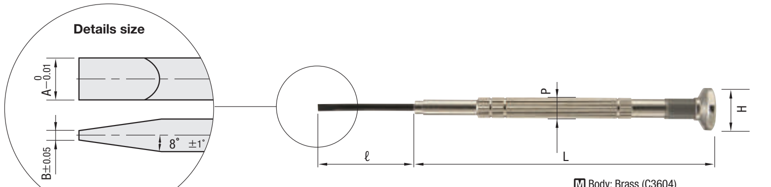
Part Number	—	Year
(Year・Month) DTBZ16	—	15
(Day) DTEZ10		

Days to Ship Quotation

Price Quotation

■Screwdriver for Date Marked Pin Set

RoHS



M Body: Brass (C3604)
Tip section: SWRH hard steel copper wire
S Body: Nickel plated
Tip section: Black Oxide (Fe_3O_4)

H	P	A	B	L	ℓ	Applicable Date marked Size	Part Number		U/Price
							Type	No.	1～9
8.6	3.5	0.9	0.12	57.8	18	D3	DTPPN	3	Quotation
10	4.5	1.4	0.15	68	20	D4・D5		4	
11	5	1.8	0.25	70.2	23	D6		6	

Please use for date marked pins of small diameter (D3・D4・D5・D6). When used for DTBZ and DTEZ, however, please select DTPPN4 for D6, and DTPPN6 for D8.

Order

Part Number
DTPPN4

Days to Ship Quotation

Price Quotation

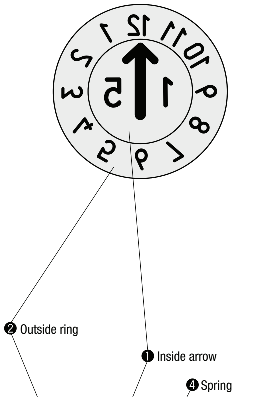
GUIDE FOR DATE MARKED PIN SETS L ADJUSTABLE TYPE

Non JIS material definition is listed on P.1351 - 1352

■Features of Date Marked Pin Sets

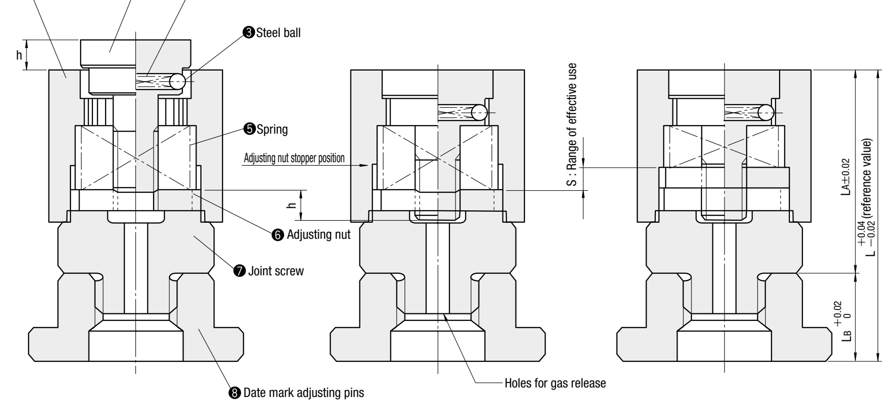
- This L-adjustable Date Mark Pin set can be mounted to the mold in the same way like a head-fixing pin, by assembling the Outside Ring and the Date Mark Adjustable Pin. Overall length of the Date Mark Pin can be set at your desired length by adjusting the Date Mark Adjusting Pin.
- Maintanance becomes easy, because the inside arrow can be replaced from PL side without removing the plate.
- Facilitates quality control and lot management of finished products.
- The month indication can be easily changed from the PL side. (Simply turn the arrow using a screw driver.)
- Incorporates a steel ball stopper mechanism that is superior to an O-ring stopper in positioning accuracy, and more tolerable to gas and heat that are generated during molding.
- Inside arrows is common with PL exchange type.

■ Structure and Usage



Item	M	H
① Inside arrow ② Outside ring	SUS420	50～53HRC
③ Steel ball	SUS440C	58HRC～
④ ⑤ Spring	SUS304	—
⑥ Adjusting nut ⑦ Joint screw	SUS420	50～53HRC
⑧ Date mark adjusting pins	SUS440C	56～60HRC

D	h	S	Effective revolution
6	1.9	0.7	3 revolutions
8	2.2	0.9	
10	2.2	1.7	4 revolutions


h
③ Steel ball
⑤ Spring
Adjusting nut stopper position
h
⑥ Adjusting nut
⑦ Joint screw
⑧ Date mark adjusting pins
Holes for gas release
S : Range of effective use
LA±0.02
L +0.04 −0.02 (reference value)
LB +0.02 0

● Installation and removal of inside arrow

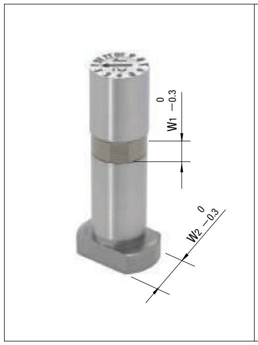
● Effective use range of date mark

● How to use the inside arrow

To attach the inside arrow	To change the month indication (Arrow direction) To remove the inside arrow
Clockwise	Counterclockwise

● How to insert the inside arrow	Use a screw driver for date marked pins **DTPPN** (☞ **P.586**) or a minus screw driver to turn the inside arrow clockwise until the adjusting nut stops. Then reverse about a half rotation from the position it stopped.
● How to use	Change the month indication by turning it counterclockwise with a screw driver for date marked pins **DTPPN** (☞ **P.586**) or a minus screw driver.
● How to take out the inside arrow	Remove the inside arrow by rotating it counterclockwise.

■How to Assemble Date Marked Set



Please assemble adjusting pins to date marked sets by suppressing spanner groove of joint screw of outside rings.

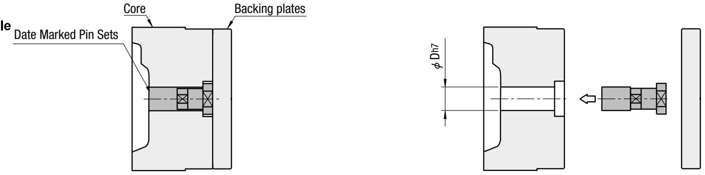
Tighten up with the torque 2.0N・m (20kgf・cm) 2.5N・m (25kgf・cm)

Please use loctite and etc. for screw to make sure of preventing it from loosening.

D	Spanner groove size	
	Outside rings	Adjusting pin
	W_1	W_2
6	5.0	6.0
8	7.0	8.0
10	9.0	10.0

Spanner groove W_2 cannot be used to position date marked pins. Note that the characters of outside rings and the position of spanner groove W_2 are not related.

ex Example



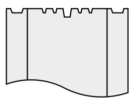
■Notes

- Characters on the finished products will be embossed normal character(Convex).
- Keep mold temperature under 150℃.
- Please note that the disassembly of joint screws of outside ring will cause damage and become disabled.
- ⊗ Date mark pin set cannot be assembled to ejector pin tip.
  Please note that sliding of date marked set like ejector pin will cause damage of joint screw.
- ⊗ Cannot be used for die cast. Use Date Marked Pins for Die Cast. (☞ **P.1291**)

■Shape of Marks and Character Font

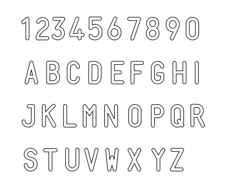
Date marked pin sets	Finished products
Reverse character (Concave character)	Normal character (Convex embossed character)

● Shape of marks



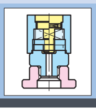
D	Depth of mark (mm)			Drafts for pulling (Angle, one side)	
	Characters	Arrow		Characters	Arrow
		Standard	Shallow		
6	0.18	0.4	0.18	22°	13°
8	0.2	0.4	0.2	24°	
10	0.22	0.5	0.22	25°	

● Character font



DATE MARKED PIN SETS

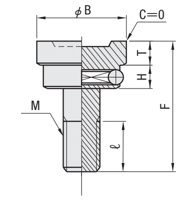
—L ADJUSTABLE TYPE—



Non JIS material definition is listed on P.1351 - 1352

Guide P.569

① Inside Arrow

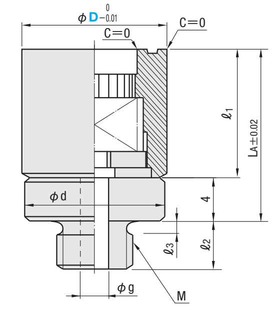


■ Inside Arrow(For single items P.573)

No.	F	T	H	B	ℓ	M×P
6	7.7	1.5	3.0	3.7	2.7	M1.6×0.20
8	9.7	2.0	3.5	5.0	3.2	M2.3×0.25
10	11.7	2.5	4.0	6.3	4.0	M2.5×0.35

M SUS420
H 50 ～ 53HRC

② Outside Ring

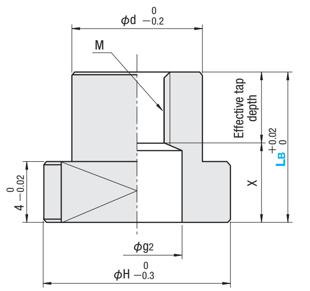


■ Outside Ring(For single items P.591)

D	LA	ℓ1	ℓ2	ℓ3	M (Coarse thread)	g	d
6	12	8	4	1.0	M3	1.0	5.5
8	14	10	5	1.0	M4	1.0	7.5
10	16	12	6	1.5	M5	1.5	9.5

M SUS420
H 50 ～ 53HRC

③ Date Mark Adjusting Pins



■ Date Mark Adjusting Pins

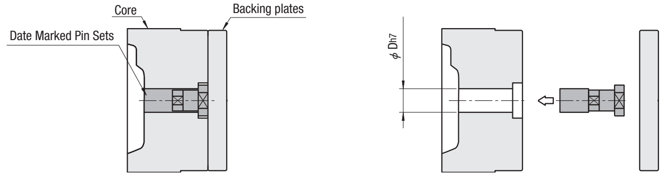
No.	d	H	M (Coarse thread)	g2
6	5.5	9	M3	3.5
8	7.5	11	M4	4.5
10	9.5	15	M5	5.5

•(Effective tap depth)＝LB－X

LB	X		
	No.6	No.8	No.10
10.00～20.00	4	2	0
20.01～30.00	14	12	10
30.01～40.00	24	22	20
40.01～50.00	34	32	30
50.01～60.00	—	42	40
60.01～70.00	—	—	50

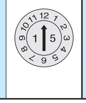
M SUS440C
H 56～60HRC

Example

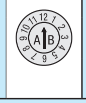


① Inside Arrow ＋② Outside Ring Set

■Year・Month Type

Indication		Outside rings divisions	Part Number Type	D	Year	U/Price 1～9
Year・Month		12 uniform divisions	DTBXL	6	15 for 2015 ※Days to ship will be 5-days for the adjustment of production after November 2015. 16 for 2016 (available from Sept.,2015) ※Days to ship will be 5-days for the adjustment of production after November 2016. 17 for 2017 (available from Sept.,2016) ※Days to ship will be 5-days for the adjustment of production after November 2017.	Quotation
				8		
				10		

■Character Designation Type

Indication		Outside rings divisions	Part Number Type	D	Engraving characters (2 characters・Characters printed in blue in indications)	U/Price 1～9
2 characters・Month		12 uniform divisions	DTMBXL	6	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation
				8		
				10		

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

Use ¥ for indicating ／(slash), ＃ for —(minus), and % for ⬚(space).

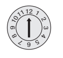
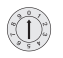
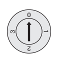
Order

Part Number	—	Year
Year・Month Type DTBXL 8	—	15
Month Type DTDXL 8		

Part Number	—	Characters for engraving
Character Designation Type DTMBXL8	—	AB

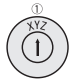
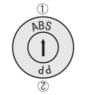
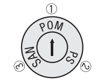
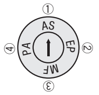
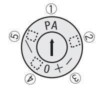
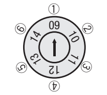
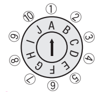
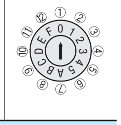
Days to Ship Quotation

■Month・Day Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1～9
Month		12 uniform divisions	DTDXL	6	Quotation
				8	
				10	
Day (1st digit)		10 uniform divisions	DTEXL	6	
				8	
				10	
Day (2nd digit)		12 uniform divisions	DTFXL	6	
				8	
				10	

Price Quotation

■Outside Ring Character Designation Type

Indication							
1M (1 place)	2M (2 places)	3M (3 places)	4M (4 places)	5M (5 places)	6M (6 places)	10M (10 places)	12M (12 places)
Engraving position 	Engraving position 	Engraving position 	Engraving position 	Engraving position  Outside ring is divided equally among ten.	Engraving position  ① 09 10 11 12 13 14 ② ③ ④ ⑤ ⑥	Engraving position  ① A B C D E F G H I J ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ Outside ring is divided equally among ten.	Engraving position 
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number Type	Indication	D	Engraving characters (1～3 characters・Characters printed in blue in indications) Engraving position ①～⑫	U/Price 1～9 1M	2M	3M	4M	5M	6M	10M	12M
DTXL	1M 2M 3M 4M 5M 6M 10M 12M	6	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation							
		8									
		10									

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

Use ¥ for indicating ／(slash), ＃ for —(minus), and % for ⬚ (space).

●Dividing of outside rings

1M・2M・3M・4M・6M・12M	12 uniform divisions
5M・10M	10 uniform divisions

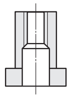
Order

Part Number	① Characters for engraving	② Characters for engraving	③ Characters for engraving	④ Characters for engraving	⑤ Characters for engraving	⑥ Characters for engraving	…	⑫ Characters for engraving
DTXL 3M 6	POM	PS	SAN					
DTXL 5M 10	PA	%	#＋	0%	¥%	(No character can be designated by ⬚ (space).)		
DTXL 6M 10	09	10	11	12	13	14		
DTXL12M 10	0	1	2	3	4	5	…	F

Days to Ship Quotation

Price Quotation

③ Date Mark Adjusting Pins

Type	Part Number Type	No.	LB 0.01mm increments	U/Price 1～9 LB10.00～30.00	LB30.01～50.00	LB50.01～70.00
	CPWDT—L Except for No.6 LB50.01～70.00	6	10.00～50.00	Quotation		—
		8	10.00～60.00			
		10	10.00～70.00			

Order

Part Number	—	LB
CPWDT—L 8	—	25.32

Days to Ship Quotation

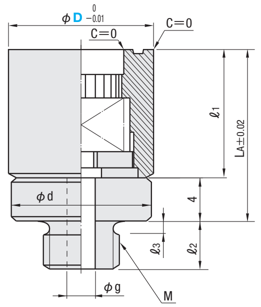
Price Quotation

OUTSIDE RINGS FOR L ADJUSTABLE TYPE

Guide P.569

RoHS

②Outside Ring



■ Outside Ring

D	LA	ℓ1	ℓ2	ℓ3	M (Coarse thread)	g	d
6	12	8	4	1.0	M3	1.0	5.5
8	14	10	5	1.0	M4	1.0	7.5
10	16	12	6	1.5	M5	1.5	9.5

M SUS420
H 50～53HRC

Outside rings on this page are adapted for combination with inside arrows of date marked pin sets on **P.573** and products on **P.590**.

①Inside Arrows P.573

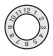
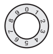
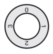
(Inside arrows is common with PL exchange type)

③Date Mark Adjusting Pins P.590

Non JIS material definition is listed on P.1351 - 1352

②Outside Ring

■Month・Day Type

Indication		Outside rings divisions	Part Number Type	D	U/Price 1～9
Month		12 uniform divisions	DTDXL−R	6	Quotation
				8	
				10	
Day (1st digit)		10 uniform divisions	DTEXL−R	6	
				8	
				10	
Day (2nd digit)		12 uniform divisions	DTFXL−R	6	
				8	
				10	

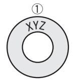
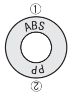
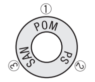
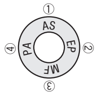
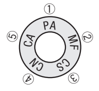
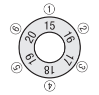
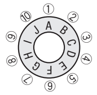
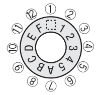
☎ **Order**

Part Number
DTDXL−R10

Days to Ship Quotation

Price Quotation

■ Character Designation Type

Indication							
1M (1 place)	2M (2 places)	3M (3 places)	4M (4 places)	5M (5 places)	6M (6 places)	10M (10 places)	12M (12 places)
Engraving position	Engraving position	Engraving position	Engraving position	Engraving position	Engraving position	Engraving position	Engraving position
							
				Outside ring is divided equally among ten.		Outside ring is divided equally among ten.	
Up to 3 characters can be designated at each engraving position.			Up to 2 characters can be designated at each engraving position.			Only 1 character can be designated at each engraving position.	

Part Number Type	Indication	D	Engraving characters (1～3 characters・Characters printed in blue in indications) Engraving position ①～⑫	U/Price 1～9 1M	2M	3M	4M	5M	6M	10M	12M
DTXL−R	1M 2M 3M 4M 5M 6M 10M 12M	6 8 10	0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z	Quotation							

Name	Characters for engraving	Order code
Slash	／	¥
Greater	＞	＞
Less	＜	＜
Plus	＋	＋
Minus	—	#
Space	⬚	%

Use ¥ for indicating ／(slash), # for —(minus), and % for ⬚ (space).

●Dividing of outside rings

1M・2M・3M・4M・6M・12M	12 uniform divisions
5M・10M	10 uniform divisions

☎ **Order**

Part Number — ① Characters for engraving — ② Characters for engraving — ③ Characters for engraving — ④ Characters for engraving — ⑤ Characters for engraving — ⑥ Characters for engraving … — ⑫ Characters for engraving
DTXL−R 3M 6 — POM — PS — SAN
DTXL−R 6M10 — 09 — 10 — 11 — 12 — 13 — 14
DTXL−R12M10 — % — 1 — 2 — 3 — 4 — 5 … — F

Days to Ship Quotation

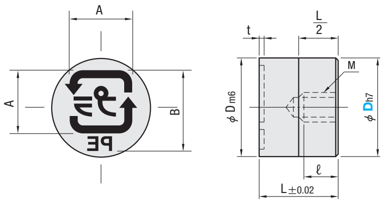
Price Quotation

Non JIS material definition is listed on P.1351 - 1352

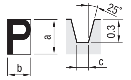
■Recycle Marked Pins for Identification of Plastic Packaging

RoHS

RMP□M



・Details of character section



D	a	b	c
12	1.8	1.2	0.26
16	2.25	1.5	0.33
20	2.7	1.8	0.4

M SUS420
H 50～53HRC

L	M	ℓ	A	B	t	Part Number Type	D	Characters for engraving	U/Price 1～9
12	M5	7	8	10.3	0.3	RMP2M (2 character type) RMP3M (3 character type)	12	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ⬚*	Quotation
14	M6	7	10	12.8	0.3		16		
16	M6	8	12	15.4	0.3		20		

* Use % for⬚ (Space).

☎ Order

Part Number	—	Characters for engraving
RMP2M16	—	PP
RMP2M12	—	%%

(When no character required.)

Days to Ship **Quotation**

Price **Quotation**

■How to Mount Make a hole (H7) on the plate and lightly drive the recycle marked pin into it using a wood hammer, etc. Then adjust the marking position and fix with a bolt.

<Compulsory Identification>

・**Subject of Identification**

Identification marks of plastic containers have been made compulsory since April 1, 2001 in order to encourage consumers to dispose waste separately.

Regulations including recommendations, decrees, and penalties have been in effect since April 1, 2003.

Plastic containers and packaging are subject to identification under the regulations. Additionally, the items subject to compulsory re-merchandising in the Container and Packaging Recycle Law are subject to displaying this information according to the purpose.

・**Party with identification obligation**

Enterprises which use plastic containers and packaging, specified enterprises, and import dealers have the obligation to display identification. In contrast to obligation of remerchandising, small-scale enterprises also have the obligation to display identification.

・**Material indication**

In addition to identification marks, material identifications showing the type of plastic have been considered voluntary. Identification cannot be omitted even when there are material identifications using the SPI method (for export) or others.

・**Material identification, and notation of complex material and complex raw material**

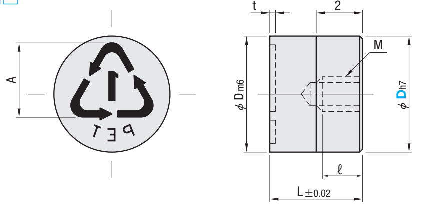
Material indication of plastic container packages are recommended to be shown using marks specified in JIS K6899—12000(ISO 1043—11997).

When showing the marks with identifications of plastic container packages, **left and right angle brackets,>** and <, are not required.

■Recycle Marked Pins

RoHS

RM□□



M SUS420
H 50～53HRC

L	M	ℓ	A	t	Part Number Type	D	U/Price 1～9
10	M4	5	5	0.2	RM1J RM1E RM2J RM2E RM3J RM3E RM4J RM4G RM5J RM4F RM6J RM7E RM7J	8	Quotation
12	M5	7	6	0.3		10	
14	M6	7	10	0.3		16	
16	M6	8	12	0.3		20	

☎ Order

Part Number
RM1J 8

Days to Ship **Quotation**

Price **Quotation**

■Benefits

- Adding a recycle mark on the finished products enables consumers to identify them as recyclable materials and helps promote recycling.
- Characters on the finished products will be emboss (Convex).

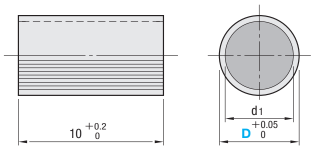
■How to Mount

Make a hole (H7) on the plate and lightly drive the date marked pin into it using a wood hammer, etc. Then adjust the marking position and fix with a bolt.

Applicable Plastics	Polyethylene terephthalate	High density Polyethylene	Polyvinyl chloride	Low density Polyethylene		Polypropylene	Polystyrene	Others (including multi-layered plastics)
US SPI standard	RM1J	RM2J	RM3J	RM4J		RM5J	RM6J	RM7J
	1 PETE	2 HDPE	3 V	4 LDPE		5 PP	6 PS	7 OTHER
German and French standards comparable to US SPI standard	RM1E	RM2E	RM3E	RM4G (Germany)	RM4F (France)	RM5J (Common with US SPI Standard)	RM6J (Common with US SPI Standard)	RM7E
	1 PET	2 PE-HD	3 PVC	4 PE-LD	4 PE-BD	5 PP	6 PS	7 O

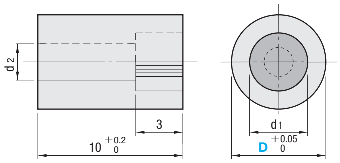
US SPI (Society of Plastics Industry)

Part Number	D
TSVS	2・3・4
TSVA	2・3・4
TSVB	2・3・4
TSVC	2・3
TSVD	6・8



M SUS316
H 130～190HV

Part Number	D
TSVA	6
TSVB	6・8・10
TSVC	5・6・8・10



d_1=a vent section
M SUS316
H 130～190HV

Hole Hole diameter	Reference value No. of holes	d_1 reference value	d_2	Part Number Type	D	U/Price 1～9
0.02	224	1.8	—	TSVS	2	Quotation
	532	2.9	—		3	
	750	3.1	—		4	
0.03	280	1.6	—	TSVA	2	
	630	2.6	—		3	
	1120	3.5	—		4	
	1120	2.3	2		6	
0.05	225	1.5	—	TSVB	2	
	225	1.8	—		3	
	225	2	—		4	
	400	2.2	2		6	
	1600	4.3	4		8	
	3600	6.3	6		10	
0.1	55	1.5	—	TSVC	2	
	76	2.1	—		3	
	76	1.8	2		5	
	76	1.8	2		6	
	300	3.9	4		8	
	690	5.8	6		10	
0.2	169	4.9	—	TSVD	6	
	288	6.5	—		8	

Select a hole diameter of 0.02 to 0.05 for plastics with a relatively good fluidity, and 0.1 or 0.2 for plastics with a lower fluidity.

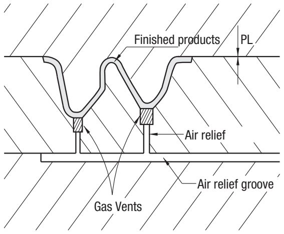
☎ Order

Part Number
TSVA6

Days to Ship **Quotation**

Price **Quotation**

Example



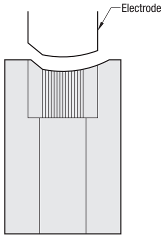
■Features

This product features a vent section made of extremely fine through holes embedded in a stainless bushing. These holes (0.02～0.2mm) can release gas with air and reduces resistance associated with plastic pouring, making it easier to take out good products. This gas vent helps improve molding productivity.

■How to Mount

1. Prepare a hole smaller by 0.03～0.05mm than the gas vent's external diameter; press fit the gas vent into it.
2. Do not strike the gas vent directly; use a copper plate, etc. to protect it.

■Notes



1.You may use a file, whetstone or sandpaper to work on the gas vent surface,
then use air to blow any metal powder away from the holes to eliminate clogging.
If this does not completely remove metal powder, use a discharging electrode apply it 0.02mm～0.03mm away from the gas vent for 30 to 50 seconds.
2.Cutting the gas vent diagonally makes the opening of the holes oval. Such oval-shaped holes tend to be easily clogged so usage of such gas vent on a flat surface should be recommended.
3. Please be careful about mounting position since traces of the gas vent holes may remain on the finished products depending on the hole diameter and the type of plastics used.
4. Prepare an air relief under the gas vent.
5.If clogged with tar or resin scum, the gas vent hole cannot release gas sufficiently. Make sure to perform maintenance work periodically by using air blow on the vent face, or applying solvent 1 or 2 hours prior to air blowing is effective to clear clogs.
6.Please inquire suppliers of which solvent is the best for the plastics you are using.

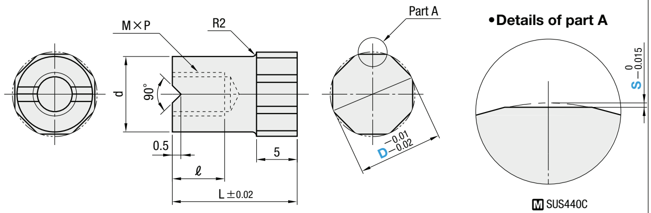
This gas vents are standardized for plastic injection molding dies.
Note that it is not applicable to compression mold, die cast mold and casting mold.

Please note that the vent section may break under high injection pressure.
Note that it is not applicable to polycarbonate resin (PC), composed resin (PC +ABS), and etc.

CAVITY INSERTS FOR GAS RELEASE

—ROUND TYPE—

RoHS **BGVS**


M×P
R2
d
90°
0.5
ℓ
5
L ±0.02
Part A
D −0.01 −0.02
•Details of part A
S 0 −0.015

There are 8 grooves for gas-release in part A.

M SUS440C
H 56~60HRC

d	L	ℓ	M×P	Part Number		S	U/Price
				Type	D		1~9
5.5	10	4.5	M3×0.5	BGVS	6	0.03 0.05	Quotation
7.5	12	6	M4×0.7		8		
9.5	15	7.5	M5×0.8		10		

Order

Part Number	—	S
BGVS 8	—	0.03

Price Quotation

Days to Ship Quotation

■Features

- It can release gas as well as air efficiently out of cavity from a groove (S).
- Even when resin tar plugs the gas-release groove in part A of above drawing, it can be removed easily by taking out the cavity insert from metal mold.
- Being made of stainless steel, it is resistant to corrosion.

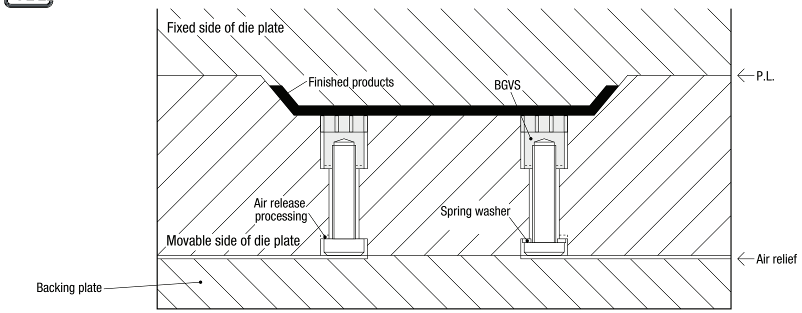
■Notes

1. Insert into a part where gas is apt to collect, such as the last filler.
2. Select an appropriate groove width (S) by resin liquidity and mold conditions.
3. Please be careful about mounting position since shape of the groove may appear on the finished product depending on the groove width and resin.

■How to Mount

1. Make a reamer hole of depth L (tolerance of H7) at the parting line (P.L) on the movable side of die plate.
2. Make a counterbore for fixing bolt in the reamer hole. Perform air release processing on the counterbore.
3. Insert BGVS into the mold and fix it with a bolt. Use of spring washer is recommended in order to facilitate prevention of loosening.

Example

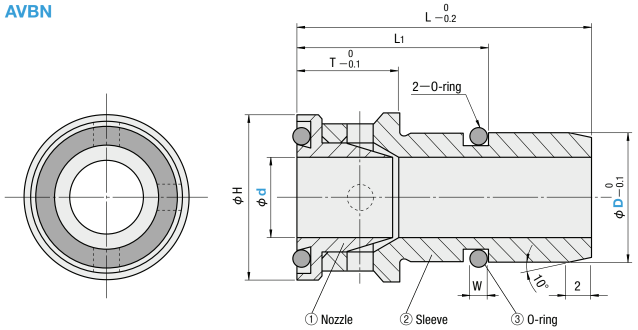

Fixed side of die plate
Finished products
BGVS
P.L.
Air release processing
Spring washer
Movable side of die plate
Air relief
Backing plate

VACUUM UNIT

—BLOW TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS **AVBN**


L 0 −0.2
L1
T 0 −0.1
2—O-ring
ϕH
ϕd
ϕD 0 −0.1
W
10°
2
① Nozzle
② Sleeve
③ O-ring

①② **M** SUM22
S Electroless nickel plated
③ **M** O-ring (fluoric rubber: 2)

H	L	L1	T	O-ring		Part Number		d	U/Price
				Thickness W	Nominal number	Type	D		1~9
8	18	13	8	1	5	AVBN	6	3	Quotation
11	25	15	8	1.5	6		8	4	
13	25				8		10	6	
16	30				10		13	9	
19	35				14		16	12	

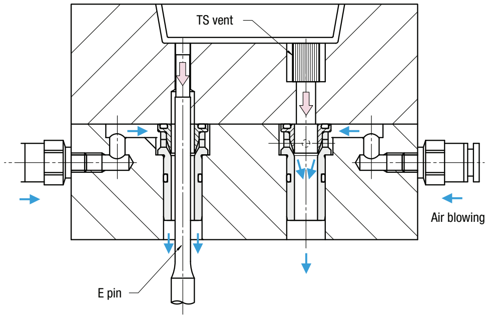
Order

Part Number	—	d
AVBN 10	—	6

Days to Ship Quotation

Price Quotation

Example


TS vent
Air blowing
E pin

■Characteristics

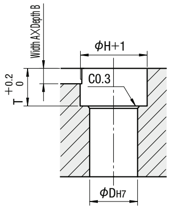
- Vacuum unit (**AVBN**) prevents molding problem of gas bake, deformation and so on, by air blowing.

■Notes

- Use it under air pressure of 0.3~0.5MPa.
- Set internal diameter d-2mm or less if ejector pin is inserted.
- Perform chamfering to avoid the damage of O-rings when mounting vacuum units.
- Please use tubes of external diameter ϕ6 or more and internal diameter ϕ4 or more.
- This unit can be used as a gas countermeasure, but its effectiveness differs depending upon the molding conditions, so it may sometimes be unable to overcome a problem.
- Specifications of unlisted dimensions may change without notice to improve performance.

■Example of recommended machining condition of air passing hole

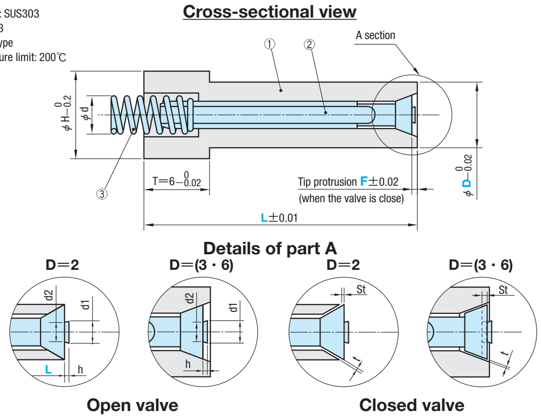
Part Number		Groove machining	
Type	D	A	B
AVBN	6	4	3
	8		
	10		
	13		
	16		


Width A×Depth B
ϕH+1
C0.3
T +0.2 0
ϕDH7

GAS VENT UNITS

MSTV

M ①Sleeve (body): SUS303
②Valve: SUS303
③Spring: SUS type
Operating temperature limit: 200℃


Cross-sectional view
A section
①
②
③
φH −0.2 0
φd
T=6 −0.02 0
Tip protrusion F±0.02
(when the valve is close)
L±0.01
φD −0.02 0
Details of part A
D=2
D=(3・6)
D=2
D=(3・6)
d2
d1
L
h
St
t
Open valve
Closed valve

Head diameter H	Tip			Stroke st	Gas exhaust clearance t	Spring dia. d	(Spring load) N	Part Number		L	F	U/Price
	d1	d2	h					Type	D			1～6
4	1.0	0.9	0.3	0.05～0.1	0.03～0.06	2.9	0.68	MSTV	2	20	—	Quotation
5	1.0	0.9		0.2 ～0.3	0.1 ～0.15	2.9	0.68		3	20	0.3	
8	1.5	1.3		0.3 ～0.4	0.15～0.2	3.8	1.96		6	25	0.5	

Order Part Number — L — F
MSTV2 — 20
MSTV3 — 20 — 0.3

Price Quotation

Days to Ship Quotation

■Characteristics

1. Effective gas exhaust
   - reduces molding defects.
     (reduction of burns, shrink, poor potting, weld lines, etc.)
   - can shorten a molding cycle.
2. Being made of stainless steel, it is resistant to corrosion.

■Notes on handling

- Resin leak from the valve and burrs may occur depending on the molding condition and the type of resin.
- Select a mounting location carefully because the shape of the gas vent unit will be transferred on the surface of mold products.
- Cleanse the resin gas exhaust passage and the gas vent unit periodically.
- For the shape of a gas exhaust passage, refer to the right diagram.
- Take the tip protrusion (value F) into account for a residence area of resin gas to specify L1.

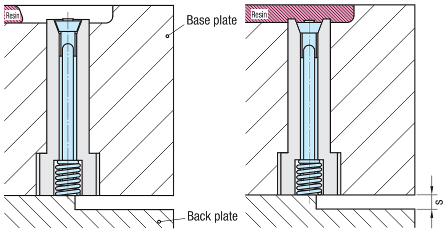
■Processing example of dimensions for gas exhaust passage

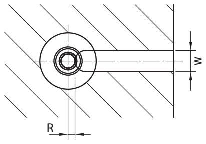
Part Number		s×w	ℓ
Type	D	Cross-sectional area of the gas exhaust passage	
MSTV	2	s=0.5 or longer 0.85mm² or larger	Specify the spring seating surface that is 3/4 or longer of the entire perimeter.
	3	s=0.5 or longer 0.85mm² or larger	
	6	s=0.5 or longer 2.30mm² or larger	

■Operation principle

The spring opens the valve and gas that resins produce and air in the mold is exhausted.

When resins reach the valve, the valve closes by resin pressure and exhaust finishes.


Resin
Base plate
Resin
Back plate
s



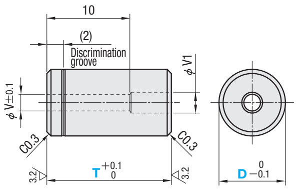
Ⓘ A gas exhaust passage that leads outside the mold is required. The exhaust should be air emission or forced exhaust (vacuuming) by a vacuum pump, a vacuum generator, etc. Note that the valve may close if exhaust pressure is high.

SPACERS FOR GAS VENT UNIT

Ⓘ Non JIS material definition is listed on P.1351 - 1352

MSTVS

Ⓘ When T dimension is 15 or smaller, V1=V No discrimination groove


10
(2)
Discrimination groove
φV±0.1
φV1
C0.3
C0.3
3.2
3.2
T +0.1 0
D −0.1 0

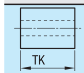
M SUS303

V	V1	Part Number		T	U/Price 1～6	
		Type	D	0.1mm increments	T5.0～25.0	T25.1～50.0
1.5	2	MSTVS	5	5.0～50.0	Quotation	
2	2.5		8			

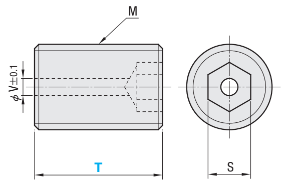
Order Part Number — T
MSTVS5 — 19.5

Days to Ship Quotation

Alterations Part Number — T — (TK)
MSTVS5 — 18.95 — TK

Alteration	Code	Spec.	1Code
 TK	TK	Changes T dimension tolerance. $T^{+0.1}_{0} \cdots\rightarrow T^{0}_{-0.02}$ Ⓘ When TK is used, T dimension alteration in 0.01mm increments possible	Quotation

MSTVM



M SUS304 equivalent

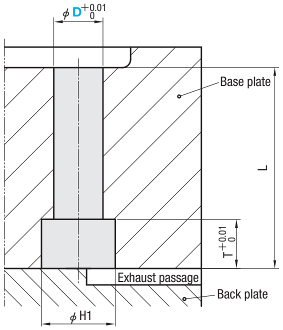
φD	Hex (S)	V	M (Coarse thread)	Part Number		T	U/Price 1～6
				Type	No.		
3	4	1.5	8 (P1.25)	MSTVM	3	12	Quotation
6	5	2	10 (P1.5)		6	15	

Order Part Number — T
MSTVM6 — 15

Days to Ship Quotation

Price Quotation

■Example of dimensions for molding holes (for MSTV)

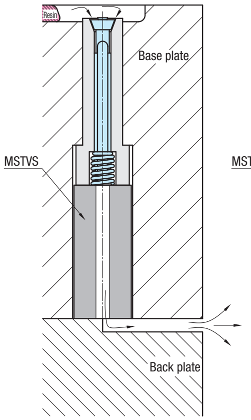

φD +0.01 0
Base plate
L
T +0.01 0
Exhaust passage
Back plate
φH1

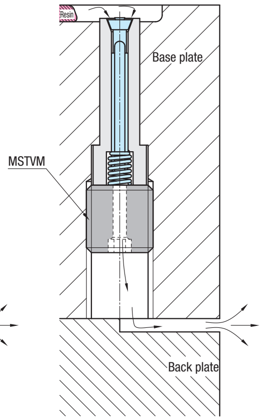
Part Number		L	Tip protrusion F	T	H1
Type	D				
MSTV	2	20	—	6	5 ※
	3	20	0.3		6
	6	25	0.5		8.5

※If you use the spacer for gas vent unit MSTVS or MSTVM for the gas vent unit MSTV2—20, H1=6 and use MSTVS5/MSTVM5.

Example

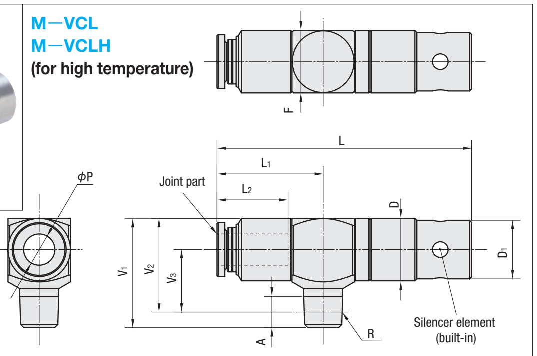
- If the base plate is thick for L dimension, use spacer (MSTVS・MSTVM), etc.
- If you use MSTVM and you are concerned about the case it loosens, take measures against loosening such as double lock.


Resin
Base plate
MSTVS
Back plate


Resin
Base plate
MSTVM
Back plate

GAS RELEASE ASSIST UNITS (VACUUM GENERATOR)

Heat resistance temperature: M—VCL (60°C)
M—VCLH (120°C)


M—VCL
M—VCLH
(for high temperature)
F
L
L1
L2
Joint part
ϕP
D
D1
V1
V2
V3
A
R
Silencer element
(built-in)

M Material

	M—VCL	M—VCLH
Joint part	Brass+Electroless nickel plated Polyacetal	Brass+Electroless nickel plated
Seal rubber	Nitrile rubber	Fluoric rubber
Main body	Aluminum	Aluminum
Silencer	Polyvinyl formal	SUS304
Thread	Sealing material application	None

L	L1	L2	V1	V2	V3	F	Tube diameter ϕP	D	D1	A	R (PT)	Part number		U/Price
												TYPE	No.	1~4 pcs.
65.2	27.2	18.2	28	24	16	16	8	16	15	8	1/8	M—VCL M—VCLH	10—018C	Quotation

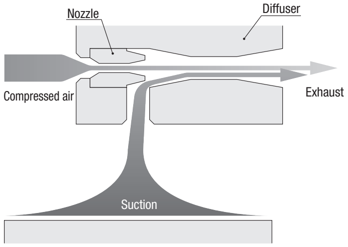
- Usable temperature range: M—VCL (0~60℃), M—VCLH (0~120℃) Usable pressure range: 0.15~0.7MPa, Rated pressure supply: 0.5MPa
- M—VCLH (for high temperature) is delivered without silencer embedded in the main body.
  For use, make sure to remove the exhaust part and embed a silencer.

Order Part Number
M—VCL10—018C

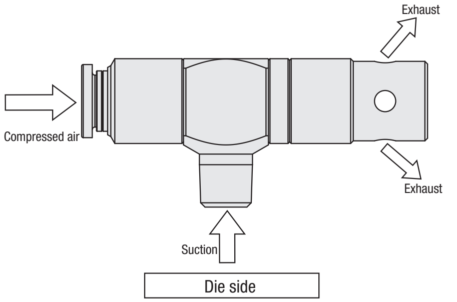
Price Quotation

Days to Ship Quotation

■Product details


Nozzle
Diffuser
Compressed air
Exhaust
Suction

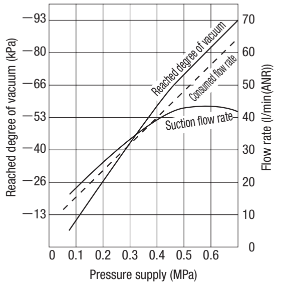
The vacuum generator converts compressed air to high-speed jet and obtains high degree of vacuum due to its structure with nozzle and diffuser.


Exhaust
Compressed air
Exhaust
Suction
Die side

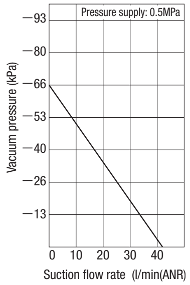
Compressed air	Vacuum flow rate	Degree of vacuum	Exhaust flow rate
0.5MPa	42ℓ/min (ANR*)	—66kPa	46ℓ/min

* ANR (Atmosphere Normale de Reference)
Reference normal atmosphere (Temperature: 20℃; Absolute pressure: 101.3kPa; Relative humidity: 65%)

■Vacuum characteristics

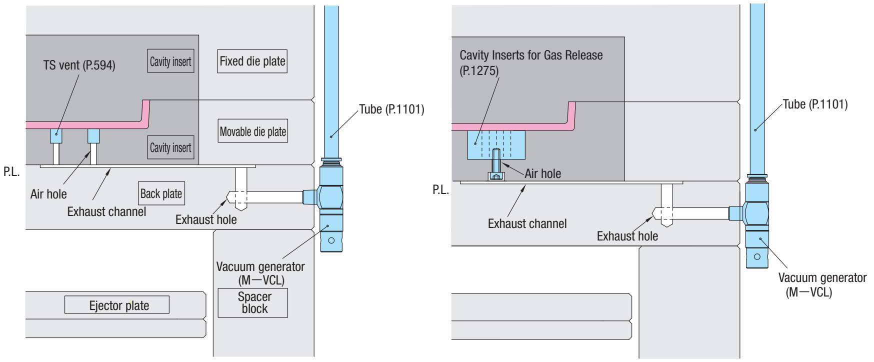


■Flow rate characteristics

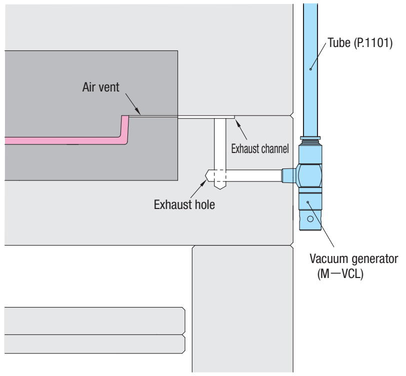


Example

■When used to support gas release from the cavity inserts for gas release・gas vent, etc


TS vent (P.594)
Cavity insert
Fixed die plate
Movable die plate
Cavity insert
Tube (P.1101)
P.L.
Air hole
Exhaust channel
Back plate
Exhaust hole
Vacuum generator
(M—VCL)
Spacer block
Ejector plate
Cavity Inserts for Gas Release
(P.1275)
Tube (P.1101)
Air hole
P.L.
Exhaust channel
Exhaust hole
Vacuum generator
(M—VCL)

■When used to support gas release from the gas vent on the PL side

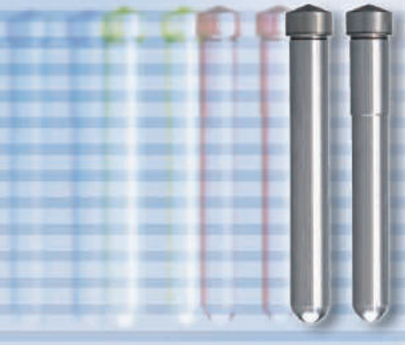

Tube (P.1101)
Air vent
Exhaust channel
Exhaust hole
Vacuum generator
(M—VCL)

■Notes

- Usable temperature range: M—VCL (0~60℃)
  M—VCLH (0~120℃)
- Usable pressure range: 0.15~0.7MPa
- Rated pressure supply: 0.5MPa
- Use clean air for compressed air as long as possible. (Otherwise, foreign materials may adhere inside the equipment and deteriorate its functionality.)
- Because the material of the M—VCLH (for high temperature) silencer is SUS304, it may be washed and reused. (not possible for M—VCL)
- Silencer (built-in part) can be used even after removal. (Exhaust noise is increased to some extent, but it does not affect functionality.)

■Resin which generates gas easily

- ACS resin
- PC (Polycarbonate)
- ABS resin
- PC/ABS (Alloy)
- POM (Polyacetal)
- Modified PPE (Modified polyphenylene ether)
- Modified PPO (Modified polyphenylene oxide)
- PP (Polypropylene)
- TPE kinds (Thermoplastic elastomer)



ANGULAR PINS · LOCKING BLOCKS

ANGULAR PINS LOCKING BLOCKS

Product Name Part Number	Angular Pins AP	APS	—Economy type— APZ	APZS	—Tapped type— APU APUS	APHX APHXS	—Male screw type— APM	APMS
Page	605	605	607	607	609	609	611	611

Angular Pins APX	—Cap bolt type— APXS	Angular Pin Retainers APRS☐	APRW☐	Screw Bolts for Angular Pin AI	Stopper Plates for Angular Pin APP	Angular Cams ANCE	ANC
611	611	613	613	614	614	615	615

Positioning Locking Blocks—Blank · Plain type— LBCSK	LBCMK	—Blank · Oil groove type— LBCSM	—Blank · Oil free type— LBCSZ	—Angle (G) designation · Inlay part 4mm type— LBCS	LBCM	—Angle (G) designation · Inlay part 8 · 10mm type— LBCSH	LBCMH
617	617	617	617	619	619	619	619

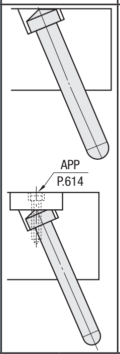
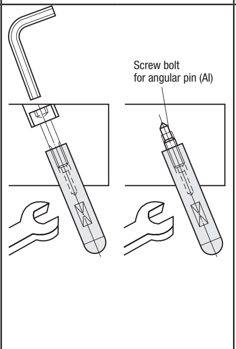
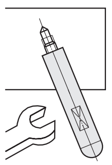
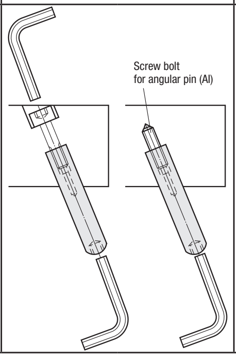
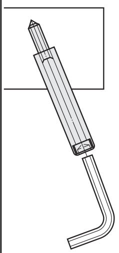
—Width (A) · Angle (G) designation · Inlay part 4mm type— LBCSF	LBCMF	Positioning Locking Blocks—Free designation type— LBC☐I	—Positioning Locking Blocks with beveled bottom— LBCST
621	621	623	624

Locking Blocks —Inlay type · Inlay part (E) · Angle (G) designation— LBMS	LBMM	—Inlay · PL installation type— LBPS	LBPM	Locking Blocks with Angular Hole Process —For PL installation · Width space saving type— ABPXE
625	625	627	627	628

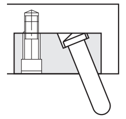
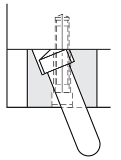
Locking Blocks with Angular Hole Process —For PL installation · Width space saving · High precision type— ABPX	Locking Blocks with Angular Holes ALBMS	—PL installation type— ALBPS
628	629	630

GUIDE FOR ANGULAR PINS

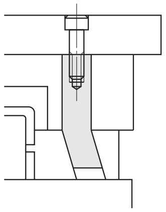
■List of Angular Pins

Type	Head type	Tapped—Wrenching type—	Male screw type	Tapped—Hexagonal wrench socket type—	Cap bolt type
Part Number	AP P.605 APS P.605 APZ P.607 APZS P.607	APU P.609 APUS P.609 AI P.614	APM P.611 APMS P.611	APHX P.609 APHXS P.609 AI P.614	APX P.611 APXS P.611
Example	 APP P.614	 Screw bolt for angular pin (AI)		 Screw bolt for angular pin (AI)	

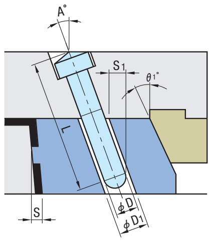
■Angular Pin Retainers

Type	Part Number	Page
	—Single bolt type— APRSS (S45C) APRSM (HPM2T equivalent)	P.613
	—Double bolt type— APRWS (S45C) APRWM (HPM2T equivalent)	P.613

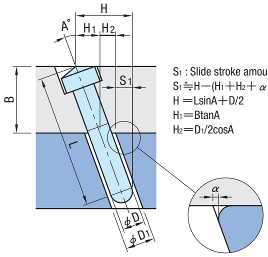
■Angular Cams

Type	Part Number	Page
	—Angle selection type— ANCE (SKD11) —Angle designation type— ANC (SKD11)	P.615

■Calculation Example of Slide Stroke



S : Undercut amount
S_1: Slide stroke amount ($S<S_1$)
D : Angular Pin diameter ($\phi D_1=D+1$)
D_1: Slide core diameter
A° : Angle for angular pin
θ_1 : Angle for locking block
θ_1 =A° +(2° ~5°)

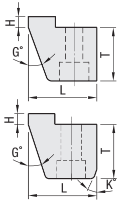
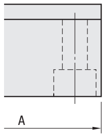


S_1 : Slide stroke amount
$S_1 \fallingdotseq H-(H_1+H_2+\alpha)$
$H = L\sin A + D/2$
$H_1 = B\tan A$
$H_2 = D_1/2\cos A$

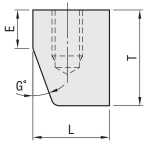
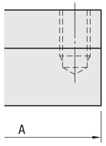
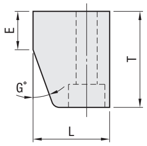
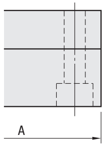
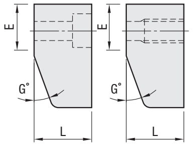
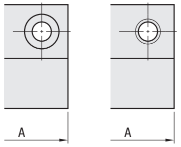
GUIDE FOR LOCKING BLOCKS

Non JIS material definition is listed on P.1351 - 1352

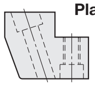
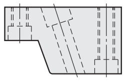
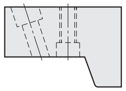
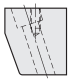
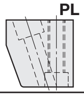
■Positioning type

Shape	Bolt fixing way	Category	Inlay section	Dimension designation				Material			Page
				Width (A)	Angle (G)	Angle (K)	Inlay section (H)	SKS3	HPM2T equivalent	SKD61	
Positioning type 	PL side setting 	Plain	4mm	(Selection)	○	(Selection)	—	LBCST	—	—	P.624
				(Selection)	(Selection)	—	—	LBCSK	LBCMK	—	P.617
				(Selection)	○		—	LBCS	LBCM	—	P.619
			8 ·10mm	(Selection)	○		—	LBCSH	LBCMH	—	P.619
			4mm	○	○		—	LBCSF	LBCMF	—	P.621
			Free	○	○		○	LBCSI	LBCMI	LBCDI	P.623
		(Precision)	4mm	○	○		—	LBCSV	LBCMV	LBCDV	
		Oil groove	4mm	(Selection)	(Selection)		—	LBCSM	—	—	P.617
		Oil-free	4mm	(Selection)	(Selection)		—	LBCSZ	—	—	P.617

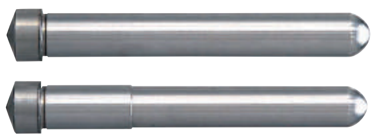
■Inlay type

Shape	Bolt fixing way	Dimension designation			Material			Page
		Width (A)	Angle (G)	Inlay section (E)	SKS3	HPM2T equivalent	SKD61	
Inlay type 	Plate side setting (with tap) 	(Selec-tion)	○	○	LBMS	LBMM	—	P.625
		○	○	○	LBMSF	LBMMF	LBMDF	
		○	○	○	LBMSV	LBMMV	LBMDV	
	PL side setting (with bolt hole) 	(Selec-tion)	○	○	LBPS	LBPM	—	P.627
	Side setting (with bolt hole) (with tap) 	(Selec-tion)	○	○	LBSS	LBSM	—	
		(Selec-tion)	○	○	LBSST	LBSMT	—	

■Angular hole process

Shape	Bolt fixing way	Material	Page
		SKS3	
Positioning type 	Plate side setting · PL side setting	ABPXE	P.628
		ABPX	P.628
Inlay type 	Plate side setting (with tap)  	ALBMS	P.629
Inlay type 	PL side setting (with bolt hole)	ALBPS	P.630

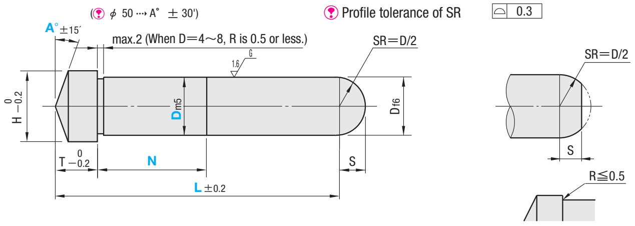
ANGULAR PINS



RoHS

D	M	H
4~ 8	SKD11	60~63HRC
10~50	SUJ2	58HRC~ (Induction hardening)

AP

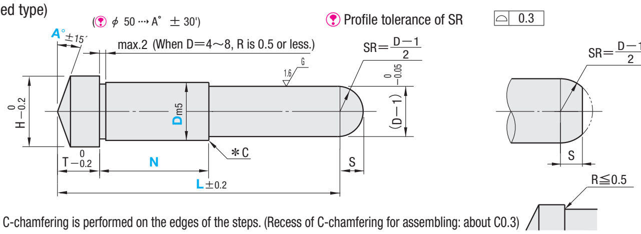


❢ When D=25 or more, the pin tip becomes as shown in the drawing on the left.

❢ When D=4~8, R is 0.5 or less.

❢ Machining may leave a chuck keyhole on one end of the pin in case of D=20 or 25. Dimensions of the pins with chuck keyholes are values prior to machining of the holes. In case of D=30 or more, the both ends may have chuck keyholes.

APS (Stepped type)



❢ When D=25 or more, the pin tip becomes as shown in the drawing on the left.

❢ When D=4~8, R is 0.5 or less.

*For D4~25, C-chamfering is performed on the edges of the steps. (Recess of C-chamfering for assembling: about C0.3)

❢ Machining may leave a chuck keyhole on one end of the pin in case of D=20 or 25. Dimensions of the pins with chuck keyholes are values prior to machining of the holes. In case of D=30 or more, the both ends may have chuck keyholes.

Order

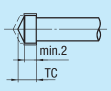
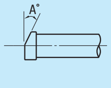
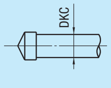
Part Number	—	L	—	N	—	A
AP25	—	200.0	—	N30.0	—	A15
APS25	—	200.0	—	N30.0	—	A15

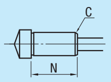
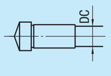
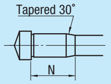
Price Quotation

Days to Ship Quotation

Alterations

Part Number — L — N — A — (TC · CM · DKC · DC · KAC · TM)
APS 25 — 200.0 — N30.0 — A15 — DC24.5 — DKC — KAC

Alterations	Code	Spec.	1Code
	TC	TC=0.1mm increments (Reduces the head thickness. The full length remains unchanged.) ❢ T TC≧H/2 tan A+2.0 TC min : Fractions are rounded up to the first decimal place. ex TC = 13/2 tan 18° + 2.0 = 4.112 ⇨4.2	Quotation
	KAC	Single flat chamfering Changes the head shape from a cone to a single flat cut. ❢ Available when D≦30	
	DKC	Press-fit section tolerance alteration Changes Dm5→D $^{+0.005}_{0}$ ❢ Available when D≦30 ❢ Available when N≦200	

Alterations	Code	Spec.	1Code
	CM	Performs C chamfering on the edge of the step. (Recess of C-chamfering for assembling : about C0.3) ❢ Available for APS when D≧30 Chamfering is performed as standard for D≦25.	Quotation
	DC	Changes (D−1) step by designation. DC=0.1mm increments Tolerance of the step's external diameter: $^{0}_{-0.05}$ ❢ D−0.1≧DC D−1 ❢ When DC is used SR=DC/2 ❢ Available for APS when D≦30	
	TM	Adds a 30° taper on the edge of step. (Taper for installation) ❢ Available for APS ⊗ Combination with CM · DC not available	

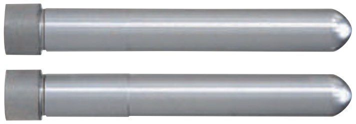
❢ Non JIS material definition is listed on P.1351 - 1352

D	m5	f6 (AP)	T	H	S		Part Number		0.1mm increments		A	U/Price for 1~9	
					AP	APS	Type	D	L	N	1° increments	AP	APS
4	+0.009 +0.004	−0.010 −0.018	5	7	2	1.5	AP APS (Stepped type)	4	15.0~ 70.0	2≦N N≦L−T−1 or N=0 (No press-fit section)	0~30	Quotation	
									70.1~ 90.0				
5				8	2.5	2		5	15.0~ 70.0				
									70.1~ 90.0				
									90.1~100.0				
6				9	3	2.5		6	15.0~ 70.0				
									70.1~ 90.0				
									90.1~110.0				
8	+0.012 +0.006	−0.013 −0.022		11	4	3.5		8	15.0~ 80.0				
									80.1~110.0				
									110.1~130.0				
10			10	13	5	4.5		10	20.0~110.0				
									110.1~160.0				
									160.1~200.0				
12	+0.015 +0.007	−0.016 −0.027		15	6	5.5		12	20.0~110.0				
									110.1~160.0				
									160.1~200.0				
									200.1~250.0				
13				16	6.5	6		13	20.0~110.0				
									110.1~160.0				
									160.1~200.0				
									200.1~250.0				
15			13	18	7.5	7		15	20.0~110.0				
									110.1~160.0				
									160.1~200.0				
									200.1~250.0				
16				19	8	7.5		16	20.0~110.0				
									110.1~160.0				
									160.1~200.0				
									200.1~250.0				
20	+0.017 +0.008	−0.020 −0.033		23	10	9.5		20	40.0~130.0				
									130.1~200.0				
									200.1~300.0				
									300.1~350.0				
25				28		10		25	40.0~130.0				
									130.1~200.0				
									200.1~300.0				
									300.1~350.0				
									350.1~400.0				
30			15	35				30	60.0~160.0				
									160.1~220.0				
									220.1~300.0				
									300.1~400.0				
									400.1~500.0				
32	+0.020 +0.009	−0.025 −0.041		37				32	70.0~160.0				
									160.1~220.0				
									220.1~300.0				
									300.1~400.0				
									400.1~500.0				
35				40				35	100.0~160.0				
									160.1~220.0				
									220.1~300.0				
									300.1~400.0				
									400.1~500.0				
40				45				40	100.0~160.0				
									160.1~220.0				
									220.1~300.0				
									300.1~400.0				
									400.1~500.0				
50			20	55				50	200.0~260.0				
									260.1~320.0				
									320.1~400.0				
									400.1~500.0				

ANGULAR PINS

—ECONOMY TYPE—

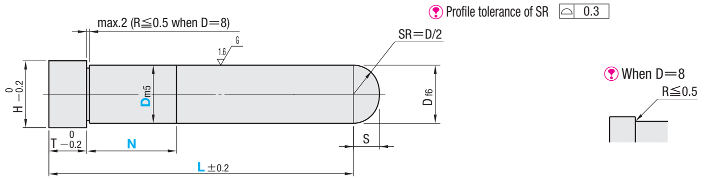
Non JIS material definition is listed on P.1351 - 1352



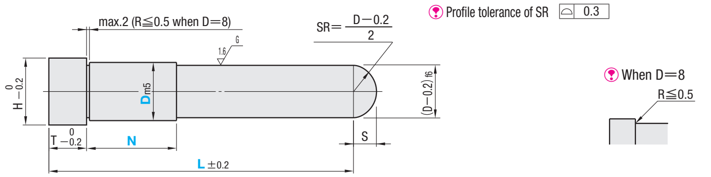
RoHS

D	M	H
8	SKD11	60～63HRC
10～20	SUJ2	58HRC～ (Induction hardening)

APZ



APZS (Stepped type)



Order Part Number — L — N

APZ13 — 100 — N30.0

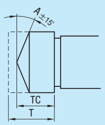
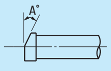
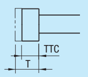
Price Quotation

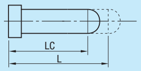
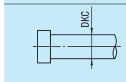
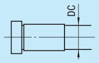
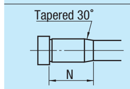
Days to Ship Quotation

Alterations Part Number — L(LC) — N — (ATC · KAC · TTC · DKC · DC · TM)

APZ13 — 100 — N30.0 — ATC — A15 — TC6.0

APZS13 — LC95 — N30.0 — KAC — A15 — DKC — DC12.5

Alterations	Code	Spec.	1Code
	ATC	Makes the head end into a cone and reduces the head thickness. The full length becomes shorter by (T−TC). The full length is the same as LC when LC is combined. A=1° increments A=0～30° TC=0.1mm increments T≧TC≧2.0 Designation method ATC−A15−TC6.0 TC≧H/2 tan A+2.0 TC min: Fractions are rounded up to the first decimal place. ex TC = 16/2 tan15° + 2.0 = 4.1432 ⇨4.2	Quotation
	KAC	Single flat chamfering Adds a single flat on the head. A=1° increments A=0～30° Designation method KAC−A15 ⊗ Combination with ATC · TTC not available.	
	TTC	Head thickness change TTC=0.1mm increments T>TTC≧2.0 The full length becomes shorter by (T−TTC). The full length is the same as LC when LC is combined.	

Alterations	Code	Spec.	1Code
	LC	Full length alteration LC=0.1mm increments D LC 8, 10 40<LC<110 12, 13 50<LC<130 15, 16 70<LC<140 20 90<LC<180 When this pin is used in combination with an ATC, the overall length becomes the dimension from the thick end face of the flange specified by the ATC.	Quotation
	DKC	Press-fit section tolerance alteration Changes Dm5→D$^{+0.005}_{0}$	
	DC	Changes (D−0.2) step by designation. DC=0.1mm increments D−0.1≧DC>D−1 Tolerance of the step's external diameter : f6 Available for APZS.	
	TM	Adds a 30° taper on the edge of step. (Taper for installation) Available for APZS. ⊗ Combination with DC not available.	

D	m5	f6	T	H	S APZ	S APZS	Part Number Type	Part Number D	L	N 0.1mm increments	U/Price for 1～9 APZ	U/Price for 1～9 APZS
8	+0.012 +0.006	−0.013 −0.022	5	11	4	3.9	APZ APZS (Stepped type)	8	40	2≦N N≦L−T−1 or N=0 (No press-fit section)	Quotation	
									50			
									60			
									70			
									80			
									90			
									100			
									110			
10			10	13	5	4.9		10	40			
									50			
									60			
									70			
									80			
									90			
									100			
									110			
12	+0.015 +0.007	−0.016 −0.027		15	6	5.9		12	50			
									60			
									70			
									80			
									90			
									100			
									110			
									120			
									130			
13				16	6.5	6.4		13	50			
									60			
									70			
									80			
									90			
									100			
									110			
									120			
									130			
15			13	18	7.5	7.4		15	70			
									80			
									90			
									100			
									110			
									120			
									130			
									140			
16				19	8	7.9		16	70			
									80			
									90			
									100			
									110			
									120			
									130			
									140			
20	+0.017 +0.008	−0.020 −0.033		23	10	9.9		20	90			
									100			
									110			
									120			
									130			
									140			
									150			
									160			
									170			
									180			

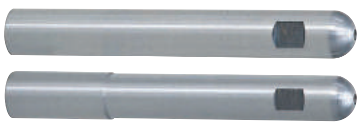
ANGULAR PINS

—TAPPED・WRENCHING TYPE/TAPPED・HEXAGONAL WRENCH SOCKET TYPE—

Non JIS material definition is listed on P.1351 - 1352

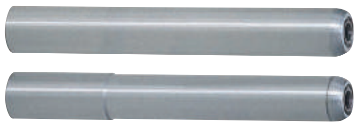
—Tapped・Wrenching type—

RoHS

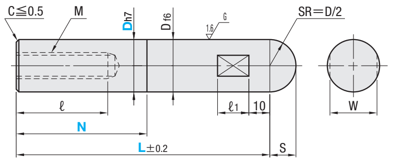


—Tapped・Hexagonal wrench socket type—

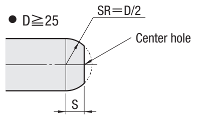
RoHS



APU Profile tolerance of SR ⌓ 0.3

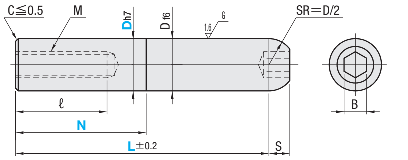


● D≧25

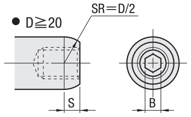


M SUJ2
H 58HRC～
(Induction hardening)

APHX Profile tolerance of SR ⌓ 0.3

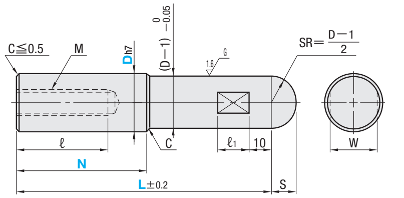


● D≧20

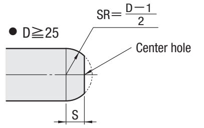


M SUJ2
H 58HRC～
(Induction hardening)

APUS(Stepped type) Profile tolerance of SR ⌓ 0.3

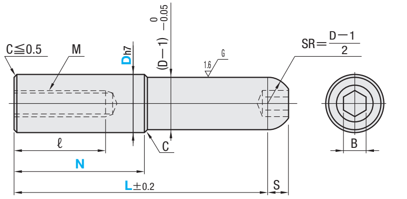


● D≧25

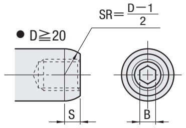


M SUJ2
H 58HRC～
(Induction hardening)

APHXS(Stepped type) Profile tolerance of SR ⌓ 0.3



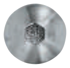
● D≧20



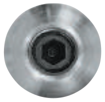
M SUJ2
H 58HRC～
(Induction hardening)

■About the hexagonal wrench socket type (APHX・APHXS)

D≦16



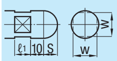
D≧20

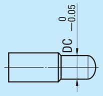


- The hexagonal wrench socket of smaller pins (D≦16) is processed by electric discharging.
- For larger pins (D≧20), a screw plug (with a hexagonal wrench socket) is embedded and fixed with Loctite No. 272 (Heat resistance temperature 230℃).

Alterations

Part Number — L — N — (WSC・DC)
APU25 — 200.0 — N40.0 — WSC
APHXS25 — 200.0 — N40.0 — DC24.5

Alteration	Code	Spec.	1Code
	WSC	Adds 4 wrenching grooves. Available for APU・APUS.	Quotation

Alteration	Code	Spec.	1Code
	DC	Changes (D−1) step by designation. DC=0.1mm increments D−0.1≧DC D−1 When DC is used SR=DC/2 Available for APUS・APHXS.	Quotation

D	h7	f6	M	ℓ	S APU	S APUS	S APHX	S APHXS	APU・APUS ℓ1	APU・APUS W	APHX・APHXS B (Hexagonal wrench socket)
10	0 −0.015	−0.013 −0.022	6	15	5	4.5	3.5	3	8	7	5 (Electric discharging)
12	0 −0.018	−0.016 −0.027			6	5.5	4	3.5	10	10 *(9)	
13			8	20	6.5	6	5	4		10	
16			10	25	8	7.5	7	6		13	
20	0 −0.021	−0.020 −0.033	12	30	10	10	6	6	12	17	6 (Screw plug) M12−L15
25							10	10		22	
30			16	40					18	27	8 (Screw plug) M16−L20
32	0 −0.025	−0.025 −0.041								27	
35										32	
40			20	40	15	15	15	15	18	36	

Part Number Type	Part Number D	0.1mm increments L	0.1mm increments N	U/Price for 1～9 APU・APHX	U/Price for 1～9 APUS・APHXS
APU APHX APUS APHXS (Stepped type)	10	30.0～110.0	L>N≧0	Quotation	
		110.1～160.0			
		160.1～200.0			
	12	35.0～110.0			
		110.1～160.0			
		160.1～200.0			
		200.1～250.0			
	13	35.0～110.0			
		110.1～160.0			
		160.1～200.0			
		200.1～250.0			
	16	45.0～110.0			
		110.1～160.0			
		160.1～200.0			
		200.1～250.0			
	20	50.0～130.0			
		130.1～200.0			
		200.1～300.0			
		300.1～350.0			
	25	50.0～130.0			
		130.1～200.0			
		200.1～300.0			
		300.1～400.0			
	30	60.0～160.0			
		160.1～220.0			
		220.1～300.0			
		300.1～400.0			
	32	60.0～160.0			
		160.1～220.0			
		220.1～300.0			
		300.1～400.0			
	35	60.0～160.0			
		160.1～220.0			
		220.1～300.0			
		300.1～400.0			
		400.1～450.0			
	40	60.0～160.0			
		160.1～220.0			
		220.1～300.0			
		300.1～400.0			
		400.1～450.0			

*W=9 when APUS12.

Order

Part Number — L — N
APHX25 — 200.0 — N40.0

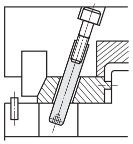
Price Quotation

Days to Ship Quotation

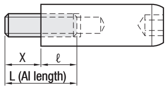
Example

■Bolt Setting

- Use this for a thick die plate.
- This is also useful when the angular pin interferes with cavity inserts.

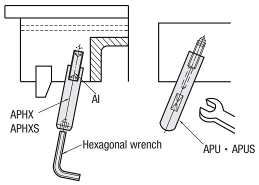


■Example of AI (Screw Bolt) Use



■Using AI (Screw Bolt)

- Can also be set from the parting line using a hexagonal wrench.



Part Number Type	Part Number M	L	ℓ Applicable depth of angular pin tap	X Effective attachment length (reference)
AI	6	30	15	15
	8	35	20	15
	10	40	25	15
	12	50	30	20
	16	60	40	20
	20	70	40	30

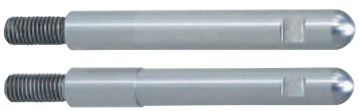
AI ☞ P.614

ANGULAR PINS

—MALE SCREW TYPE / CAP BOLT TYPE—

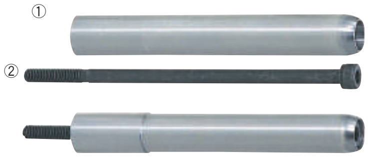
Non JIS material definition is listed on P.1351 - 1352

—Male screw type— RoHS



M SUJ2
H 58HRC
(Induction hardening)

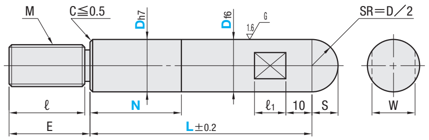
—Cap bolt type— RoHS



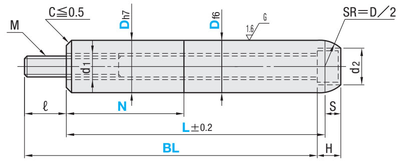
① **M** SUJ2
H 58HRC
(Induction hardening)

② **M** SCM435
Strength rank 12.9
Thread part : class2 of JIS B0205

APM Profile tolerance of SR ⌓ 0.3

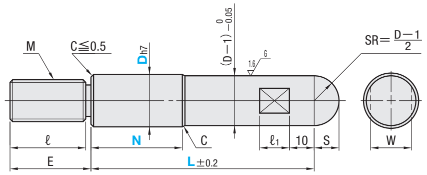


APX Profile tolerance of SR ⌓ 0.3

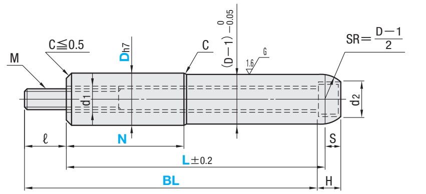


ℓ=BL+H−(L+S)
※ℓ≧M or more is required.
BL+H−(L+S)≧M

APMS (Stepped type) Profile tolerance of SR ⌓ 0.3



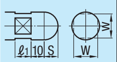
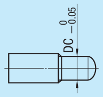
APXS(Stepped type) Profile tolerance of SR ⌓ 0.3

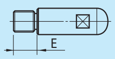


※ℓ≧M or more is required.
ℓ=BL+H−(L+S)
BL+H−(L+S)≧M

Alterations

Part Number — L — N — BL — (WSC · DC · MLC)
APMS16 — 200.0 — N40.0 — WSC — MLC
APXS20 — 200.0 — N30.0 — BL210 — DC19.5

Alterations	Code	Spec.	1Code
	WSC	Adds 4 wrenching grooves. Available for APM・APMS.	Quotation
	DC	Changes (D−1) step by designation. DC=0.1mm increments D−0.1≧DC>D−1 When DC is used : SR=$\frac{DC}{2}$ Available for APMS・APXS.	

Alteration	Code	Spec.	1Code
	MLC	Changes lengths of screw bolts of APM・APMS to shorter than the standard. ⊗ D=8 not available	Quotation

D	M	E	ℓ
10	6	12	10
12	8	14	12
13	8	14	12
16	12	22	19
20	16	27	24

■Male Screw Type

D	h7	f6	M	E	ℓ	S APM	S APMS	ℓ1	W	Part Number Type	Part Number D	0.1mm increments L	0.1mm increments N	U/Price for 1~9 APM	U/Price for 1~9 APMS
8	0 −0.015	−0.013 −0.022	6	12	10	4	3.5	8	7 *(5.5)	APM APMS (Stepped type)	8	40.0~110.0 110.1~160.0 160.1~200.0	L>N≧0	Quotation	
10				17	15	5	4.5		7		10	40.0~110.0 110.1~160.0 160.1~200.0			
12	0 −0.018	−0.016 −0.027	8	22	20	6	5.5	10	10 *(9)		12	50.0~110.0 110.1~160.0 160.1~200.0			
13						6.5	6		10		13	50.0~110.0 110.1~160.0 160.1~200.0 200.1~250.0			
16			12	27	25	8	7.5		13		16	50.0~110.0 110.1~160.0 160.1~200.0 200.1~250.0			
20	0 −0.021	−0.020 −0.033	16	32	30	10	9.5	12	17		20	50.0~130.0 130.1~200.0 200.1~250.0			

*W=5.5 when APMS8 (Stepped type) and W=9 when APMS12.

■Cap Bolt Type

D	h7	f6	d1	d2	M	H	S	Part Number Type	Part Number D	0.1mm increments L	0.1mm increments N	BL 5mm increments	BL 10mm increments	U/Price for 1~9 APX	U/Price for 1~9 APXS
12	0 −0.018	−0.016 −0.027	4.5	8	4	4.5	4	APX	12	50.0~130.0 130.1~200.0	L>N≧0	60~95	100~150	Quotation	
13			5.5	9.5	5	5.5			13				100~210		
16			7	11	6	6.5	5	APX APXS (Stepped type)	16	50.0~130.0 130.1~200.0					
20	0 −0.021	−0.020 −0.033	9	14	8	9	6		20	50.0~130.0 130.1~200.0 200.1~250.0		60~95	100~270		
25			11	17	10	11	8		25	50.0~130.0 130.1~200.0 200.1~250.0					
30			14	19	12	13	10		30	60.0~130.0 130.1~200.0 200.1~250.0					
32	0 −0.025	−0.025 −0.041							32	60.0~130.0 130.1~200.0 200.1~250.0					
35			18	25	16	17			35	60.0~160.0 160.1~220.0 220.1~300.0		60~95	100~320		
40							14		40	60.0~160.0 160.1~220.0 220.1~300.0					

Order

Part Number — L — N
APM13 — 200.0 — N30.0

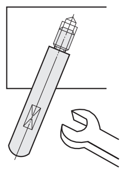
Part Number — L — N — BL
APX20 — 200.0 — N30.0 — BL210

Price Quotation

Days to Ship Quotation

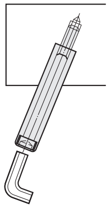
Example

● APM APMS



Insert the angular pin from the parting side and fix using a wrench.

● APX APXS



Insert the angular pin from the parting side and fix using a hexagonal wrench.

ANGULAR PIN RETAINERS

—SINGLE BOLT TYPE / DOUBLE BOLT TYPE—

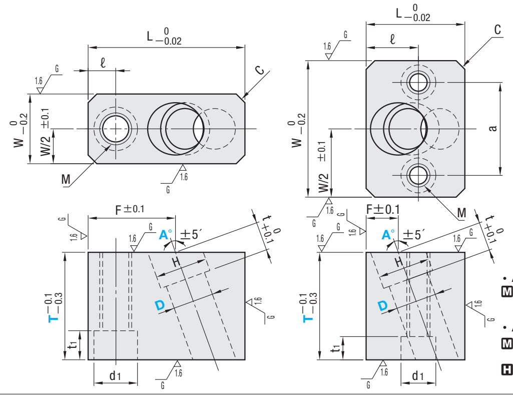
SCREW BOLTS FOR ANGULAR PIN／STOPPER PLATES FOR ANGULAR PIN

Non JIS material definition is listed on P.1351 - 1352

RoHS

Single bolt type
APRSS (S45C)
APRSM (HPM2T equivalent)

Double bolt type
APRWS (S45C)
APRWM (HPM2T equivalent)



・**APRSM・APRSS**
M S45C (Unannealed steel)

・**APRWM・APRWS**
M HPM2T equivalent (Prehardened steel)
H 37～41HRC

DH7		W	L	H	t	F	d1	t1	M (Tap)	Bolt	ℓ	a	c	Part Number Type	D	T	A° 1° increments
8	+0.015 0	16	35	12	5	19	11	7	8	M 6	7	—	3	Single bolt type **APRSS** (S45C) **APRSM** (HPM2T equivalent)	8	20	10～20
10		18	40	14	10	21									10	25	
13	+0.018 0	22	50	17		27	14	9	10	M 8	9				13	30	
16		25	55	20	13	29							5		16	35	
8	+0.015 0	38	24	12	5	8	11	7	8	M 6	14	24	5	Double bolt type **APRWS** (S45C) **APRWM** (HPM2T equivalent)	8	20 25	10～20
10		40	28	14	10	10					16	26			10	25 30	
13	+0.018 0	44	34	17		12					18	30			13	30 35	
16		48	40	20	13	13					21	34	8		16	35 40	
20	+0.021 0	58	45	24		15	14	9	10	M 8	25	40			20	40 45	
25		65	55	29		18					30	46	10		25	45 50	
30		75	65	36	15	22	18	11	12	M10	35	54			30	55 60	

Order

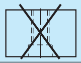
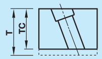
Part Number	—	T	—	A
APRWS13	—	35	—	A20

Days to Ship Quotation

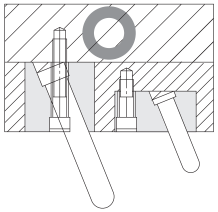
Price Quotation

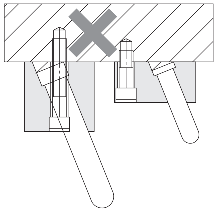
Alterations

Part Number	—	T(TC)	—	A	—	(MNC)
APRSM16	—	TC38	—	A18	—	MNC

Alterations	Code	Spec.	1Code
	MNC	No retainer mounting hole	Quotation
 T TC	TC	Thickness change, TC=0.1mm increments $T>TC \geqq \frac{T\text{min.}}{2}+t_1+2.0$ $T>TC \geqq \frac{T\text{min.}}{2}$ when MNC is combined.	

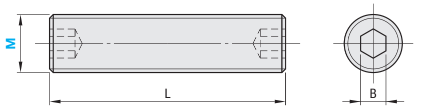
Example Make sure to use with cavity inserts.





RoHS

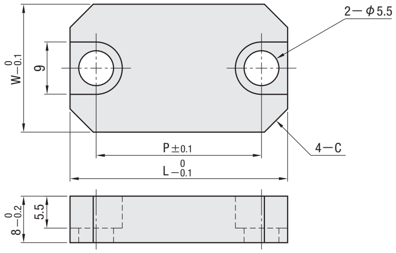
AI



M SCM435
H 33～38HRC
Strength rank10.9
S Black Oxide
(Fe_3O_4)

RoHS

APP



M S45C (Unannealed steel)

M×Pitch (Coarse thread)	L	B	Part Number Type	M	U/Price 1～9
M 6×1.0	30	3	AI	6	Quotation
M 8×1.25	35	4		8	
M10×1.5	40	5		10	
M12×1.75	50	6		12	
M16×2.0	60	8		16	
M20×2.5	70	10		20	

Applicable Angular Pins		W	L	P	C	Part Number Type	No.	U/Price 1～9
AP APS	φD=4・5・6	13	28	19	2	APP	6	Quotation
	φD=8・10	16	32	23	3		10	
	φD=12～16	22	38	29	5		16	
	φD=20	26	42	33	6		20	

Order

Part Number
AI12

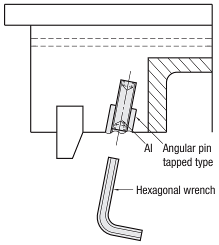
Part Number
APP10

Days to Ship Quotation

Price Quotation

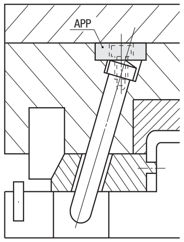
Example

■Example of AI (Screw Bolt) use

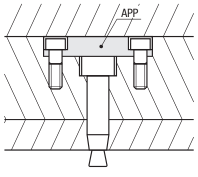


- Can also be set from the parting line.
- The angular pin can be easily removed using a hexagonal wrench, even when broken.

■Example of APP use



■Example of Runner Lock Pins use



Can also be used as a backup plate for runner lock pins.

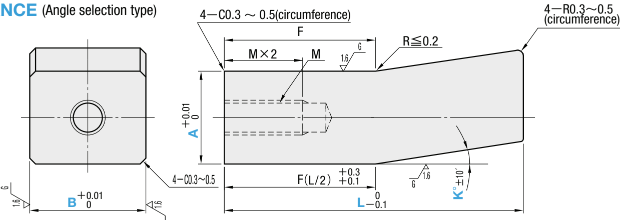
ANGULAR CAMS

—ANGLE SELECTION TYPE / ANGLE DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

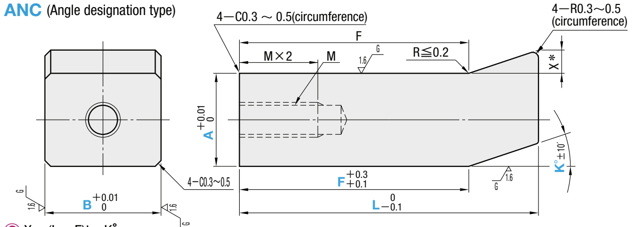
RoHS

ANCE (Angle selection type)



M SKD11
H 60～63HRC

ANC (Angle designation type)



X＝(L—F)tanK°
⊗ Manufacturing of X≧20 not possible.

M SKD11
H 60～63HRC

■Angle Selection Type

M×Pitch	Part Number		B	L	K°
	Type	A			
M6×1.0	ANCE	10	10 15	30 40 60 80	15 18 20
M8×1.25		15	10 15	30 40 60 80 100	

■Angle Designation Type

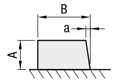
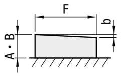
M×Pitch	Part Number		B	0.1mm increments		K° 1° increments
	Type	A		L	F	
M6×1.0	ANC	10	10 15 20 25 30	20.0～ 80.0	15.0≦F≦L—10	10～25
M8×1.25		15	10	20.0～100.0		
			15	20.0～120.0		
			20 25 30	20.0～150.0		
		20	15	20.0～120.0		
			20 25 30	20.0～150.0		
		25	20 25 30			

Order

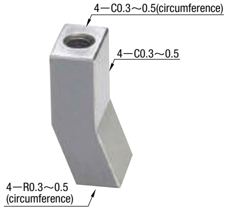
Part Number	—	B	—	L	—	F	—	K
ANCE10	—	B10	—	L30			—	K15
ANC10	—	B20	—	L50.0	—	F30.0	—	K20

Days to Ship Quotation

■Precision Standard

Reference item	Outline	Allowable range
Squareness of A・B dimension		Squareness of B plane against the vertical direction of A plane. a≦0.02
Parallelism of A・B dimension		Parallelism between top and bottom planes in F direction referring to A or B plane. b≦0.02

■Finishing of corners

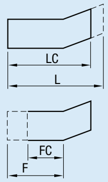


Price Quotation

Alterations

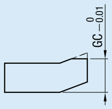
Part Number	—	B	—	L	—	F	—	K	—	(GC・MC・LC・FC)
ANCE10	—	B10	—	L40			—	K20	—	LC38.6 — FC19.3
ANC15	—	B25	—	L80.0	—	F50.0	—	K20	—	GC25.0

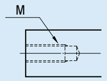
Quotation

Alterations	Code	Spec.			1Code
	LC FC	Available for ANCE only. Cuts L and F dimension. LC and FC＝0.1mm increments With FC, the overall length becomes shorter by (F—FC). However, the tap length remains unchanged. When LC is combined, the overall length becomes the same as LC.	Designaton range of LC and FC (see table below) When LC and FC are combined : LC≦L—(F—FC) LC—FC≧10	Designation method ①When LC is used : ANCE10—B10—L40—K20—LC38.6 ②When FC is used : ANCE10—B10—L40—K20—FC19.3 ③When LC and FC are combined : ANCE10—B10—L40—LC38.6—FC19.3	Quotation

Designaton range of LC and FC

L	F	LC	FC
30	15	25.0～29.9	—
40	20	30.0～39.9	15.0～19.9
60	30	40.0～59.9	20.0～29.9
80	40	50.0～79.9	30.0～39.9
100	50	60.0～99.9	40.0～49.9

Alteration	Code	Spec.	1Code
	GC	Available for ANCE・ANC Adds a cut on the back. GC＝0.1mm increments A≦GC≦{(L—F)tanK}＋A	Quotation

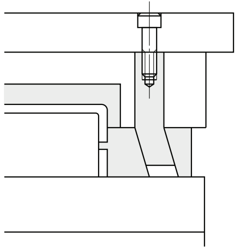
Alteration	Code	Spec.	1Code
	MC	Available for ANCE・ANC Changes the tap diameter from M8 to M6 for A dimensions of 15/20/25.	Quotation

■Features

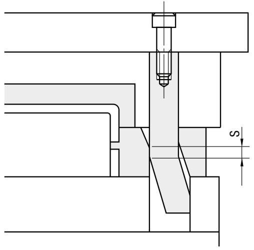
- Makes machining mold bases easier.
- Can also be used as a locking block when injection pressure is low.

Example

・Example of ANCE/ANC use



・Example of GC Alteration use



・Makes timing adjustment (S) for slide opening.

POSITIONING LOCKING BLOCKS

—STANDARD TYPE—

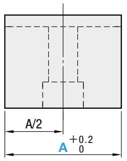
Non JIS material definition is listed on P.1351 - 1352

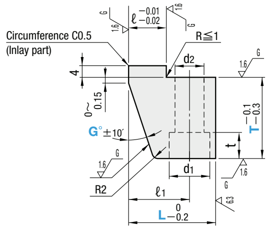
Part Number	M	H
LBCSK	SKS3	53~56HRC
LBCMK	HPM2T equivalent	37~41HRC

RoHS

—Plain type—

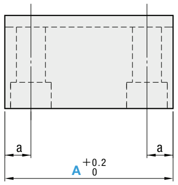
A=15~23





ℓ −0.01 −0.02
Circumference C0.5
(Inlay part)
R≦1
d2
4
0~0.15
G° ±10′
T −0.1 −0.3
t
d1
R2
ℓ1
L 0 −0.2
1.6
6.3

A=28~78



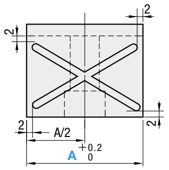
・Strength calculation for inlay sections P.1316

Part Number	M	H
LBCSM	SKS3	53~56HRC

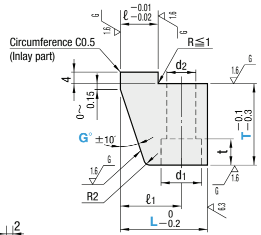
RoHS

—Oil groove type—

A=15~23

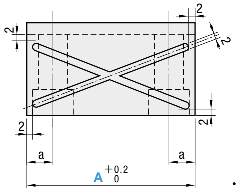


2
2
2
2
A/2
A +0.2 0



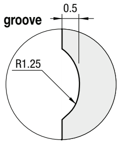
ℓ −0.01 −0.02
Circumference C0.5
(Inlay part)
R≦1
d2
4
0~0.15
G° ±10′
T −0.1 −0.3
t
d1
R2
ℓ1
L 0 −0.2
1.6
6.3

A=28~78



2
2
2
2
a
a
A +0.2 0

● Detail of oil groove



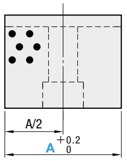
・Strength calculation for inlay sections P.1316

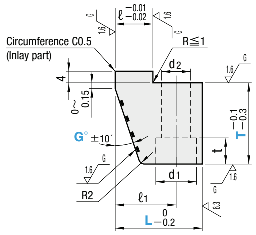
Part Number	M	H
LBCSZ	SKS3	53~56HRC

RoHS

—Oil-free (special solid lubricant) type—

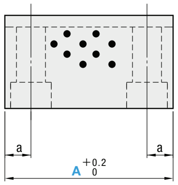
A=15~23





ℓ −0.01 −0.02
Circumference C0.5
(Inlay part)
R≦1
d2
4
0~0.15
G° ±10′
T −0.1 −0.3
t
d1
R2
ℓ1
L 0 −0.2
1.6
6.3

A=28~78



・Strength calculation for inlay sections P.1316

■ Plain type

a	ℓ	ℓ1	d1	d2	t	Part Number Type	Part Number L	T	A	G°
6	6	13	9.5	5.5	6	—Plain type— LBCSK (SKS3) LBCMK (HPM2T equivalent)	20	10	13 15 18 23 28 33 38 48	17 20 22
								15	15 18 23 28 33 38 48 58	15 17 20 22
								20		15 17
7	10	17	11.5	6.5	7		25	10	23 28 33 38 48 58	17 20 22
								15	18 23 28 33 38 48 58 68 78	15 17 20 22
								20		
8	13	21	14	9	9		30	20	33 38 48 58 68 78	15 17 20 22
								25		
								30		

■ Oil groove type・Oil-free type

a	ℓ	ℓ1	d1	d2	t	Part Number Type	Part Number L	T	A	G°
6	6	13	9.5	5.5	6	—Oil groove type— LBCSM (SKS3) —Oil-free type— LBCSZ (SKS3)	20	15	15 18 23 28 33 38 48	15 17 20 22
								20		15 17
7	10	17	11	6.5	7		25	15	28 33 38 48 58 68 78	15 17 20 22
								20		
8	13	21	14	9	9		30	20	33 38 48 58 68 78	15 17 20 22
								25		
								30		

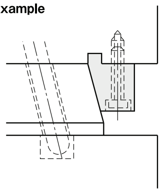
Order

Part Number	—	T	—	A	—	G
LBCSK30	—	25	—	A58	—	G15
LBCSZ30	—	25	—	A58	—	G20

Days to Ship Quotation

Price Quotation

Example



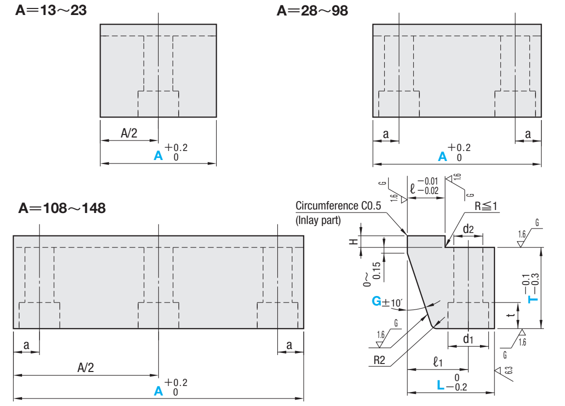
POSITIONING LOCKING BLOCKS

—ANGLE (G) DESIGNATION TYPE (INLAY PART 4mm/8 · 10mm)—

Non JIS material definition is listed on P.1351 - 1352

Part Number		M	H
Inlay part 4mm	Inlay part 8 · 10mm		
LBCS	**LBCSH**	SKS3	53～56HRC
LBCM	**LBCMH**	HPM2T equivalent	37～41HRC

RoHS



■Inlay part H=4mm

H	a	ℓ	ℓ1	d1	d2	t	Part Number Type	L	T	A	*2G° 1° increments
4	6	6	13	9.5	5.5	6	**LBCS** (SKS3) **LBCM** (HPM2T equivalent)	20	10	13 15 18 23 28 33 38 48	5～33
									15	13 15 18 23 28 33 38 48 [*1]58	5～24
									20		5～18
	7	10	17	11	6.5	7		25	10	[*1]18 [*1]23 28 33 38 48 58 68 78 88 98	5～33
									15	[*1]18 [*1]23 28 33 38 48 58 68 78 88 98 [*1]108	5～33
									20	[*1]23 28 33 38 48 58 68 78 88 98 [*1]108	5～26
									25		5～21
	8	13	21	14	9	9		30	15	33 38 48 58 68 78 88 98 108 118 128	5～33
									20		5～31
									25		5～26
									30		5～22
	10	15	24	17	11	11		35	25	38 48 58 68 78 88 98 108 118 128	5～28
									30		5～24
									35	48 58 68 78 88 98 108 118 128	5～21
									40		5～18
	13	17	27	19	14	13		40	30	58 68 78 88 98 108 118 128 138	5～26
									35		5～24
									40	68 78 88 98 108 118 128 138	5～21
									45		5～19
	16	23	33	25	18	17		50	30	78 88 98 108 118 128 138 148	5～28
									35		5～24
									40		5～21
									45		5～19

[*1] A18 · A23 · A58 · A108 is only for LBCS and LBCM.

[*2] When designating G15, 17, 20 or 22, please confirm and use the corresponding standard in angle G selection type LBCSK/LBCMK (**P.617**) which is cheap and whose production time is short.

Strength calculation for inlay sections **P.1316**

■Inlay part H=8 · 10mm

H	a	ℓ	ℓ1	d1	d2	t	Part Number Type	L	T	A	G° 1° increments
8	7	12	18	9.5	5.5	6	**LBCSH** (SKS3) **LBCMH** (HPM2T equivalent)	25	25	23 28 33 38 48 58 68 78 88 98	5～21
	10	17	25	11	6.5	7		35	30	38 48 58 68 78 88 98 108 118 128	5～24
10									40	48 58 68 78 88 98 108 118 128	5～18
8	13	19	28	14	9	9		40	30	48 58 68 78 88 98 108 118 128 138	5～26
10									35		5～24
									45		5～19
	16	25	35					50	35	58 68 78 88 98 108 118 128 138 148	5～24
									40		5～21
									45		5～19

More force applies on the inlay section as its height H increases. Take this into consideration when designating the locking block.
Strength calculation for inlay sections **P.1316**

Note that installed bolt diameter, bolt position ℓ1, and inlay section width ℓ differ from the Inlay Part H=4mm products.

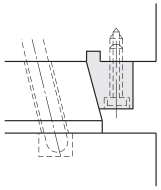
Order

Part Number	—	T	—	A	—	G
LBCS30	—	25	—	A58	—	G18
LBCM30	—	25	—	A58	—	G15

Days to Ship Quotation

Price Quotation

Example



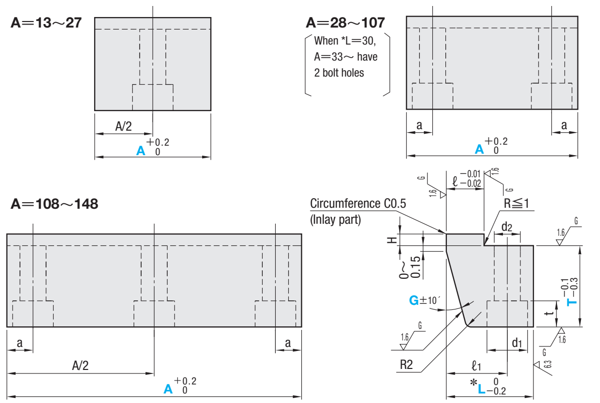
POSITIONING LOCKING BLOCKS

—WIDTH (A) • ANGLE (G) DESIGNATION TYPE (INLAY PART 4mm／8 • 10mm)—

Non JIS material definition is listed on P.1351 - 1352

Part Number Inlay part 4mm	M	H
LBCSF	SKS3	53～56HRC
LBCMF	HPM2T equivalent	37～41HRC

RoHS


A=13～27
A/2
A +0.2 0
A=28～107
When *L=30, A=33～ have 2 bolt holes
a
a
A +0.2 0
A=108～148
a
a
A/2
A +0.2 0
Circumference C0.5 (Inlay part)
ℓ −0.01 −0.02
R≦1
d2
H
0～0.15
G±10´
T −0.1 −0.3
t
d1
R2
ℓ1
*L 0 −0.2
1.6
6.3

■Inlay part　H=4mm

H	a	ℓ	ℓ1	d1	d2	t	Part Number Type	L	T	A 1mm increments	G° 1° increments
4	6	6	13	9.5	5.5	6	LBCSF (SKS3) LBCMF (HPM2T equivalent)	20	10	13～ 48	5～33
									15	13～ 58	5～24
									20		5～18
	7	10	17	11	6.5	7		25	10	18～ 98	5～33
									15	18～108	5～33
									20		5～26
									25		5～21
	8	13	21	14	9	9		30	15	*23～128 (23～32 : 1 bolt hole 33～ : 2 bolt holes)	5～33
									20		5～31
									25		5～26
									30		5～22
	10	15	24	17	11.5	11		35	25	38～128	5～28
									30		5～24
									35		5～21
									40		5～18

Please confirm and use the corresponding A • G selection type (LBCSK /LBCMK P.617) and A selection G designation type (LBCS /LBCM P.619).
Strength calculation for inlay sections P.1316

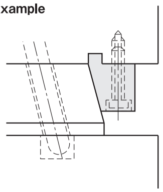
Order

Part Number	—	T	—	A	—	G
LBCSF30	—	25	—	A58	—	G18

Days to Ship Quotation

Price Quotation

Example

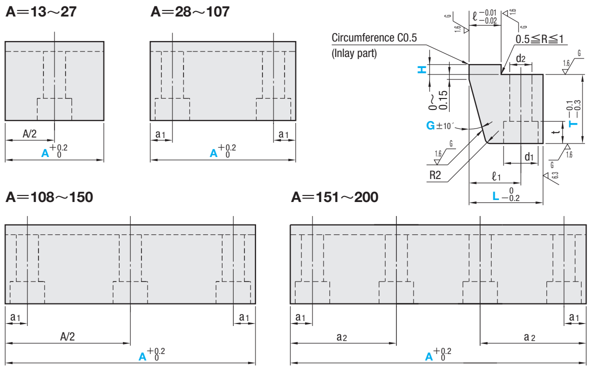


POSITIONING LOCKING BLOCKS

—FREE DESIGNATION TYPE—

Part Number	M	H
LBCSI	SKS3	53～56HRC
LBCMI	HPM2T equivalent	37～41HRC
LBCDI	SKD61	50～55HRC

RoHS



A=13～27
A=28～107
A=108～150
A=151～200
A/2
a1
a2
A +0.2 0
Circumference C0.5
(Inlay part)
0.5≦R≦1
ℓ -0.01 -0.02
d2
d1
H
0～0.15
G±10′
t
T -0.1 -0.3
R2
ℓ1
L 0 -0.2
1.6
6
6.3

L=50

A	a2
151～160	57.5
161～170	62.5
171～180	65
181～190	67.5
191～200	72.5

a1	ℓ	ℓ1	d1	d2	t	Part Number Type	Part Number L	T	1mm increments A	1mm increments H	G° 1° increments
6	8	14	9.5	5.5	6	**LBCSI** (SKS3) **LBCMI** (HPM2T equivalent) **LBCDI** (SKD61)	20	15	13～ 60	3～ 8	5～24
								20			5～18
7	12	18					25	20	18～100	3～ 8	5～26
8	15	22					30	15	23～130	3～10	5～33
								20			5～33
								25			5～28
								30			5～25
10	17	25	11	6.5	7		35	25	38～150	3～15	5～33
								30			5～28
								35			5～25
								40			5～22
13	19	28	14	9	9		40	30	48～150		5～32
								35			5～28
								40			5～25
								45			5～22
16	25	35					50	40	68～200		5～31
								45			5～28

! More force applies on the inlay section as its height H increases. Take this into consideration when designating the locking block.
! Note that installed bolt diameter, bolt position ℓ1, and inlay section width ℓ differ from the Inlay Part H=4mm products.

Strength calculation for inlay sections ☞ P.1316

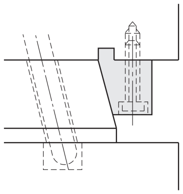
Order

Part Number	T	A	H	G
LBCSI 30	25	A68	H8	G26

Days to Ship Quotation

Price Quotation

Example



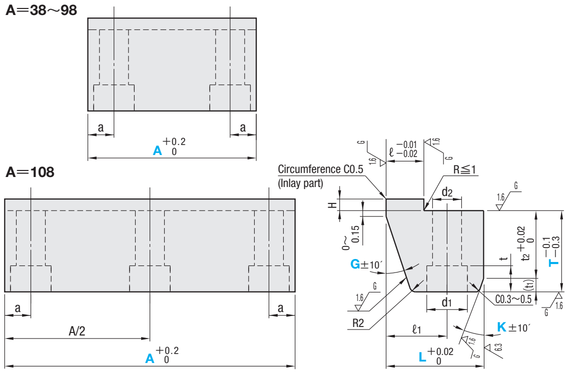
POSITIONING LOCKING BLOCKS WITH BEVELED BOTTOM

—ANGLE (G) DESIGNATION TYPE (INLAY PART 4mm)—

! Non JIS material definition is listed on P.1351 - 1352

Part Number Inlay part 4mm	M	H
LBCST	SKS3	53～56HRC

RoHS



A=38～98
A=108
a
A/2
A +0.2 0
Circumference C0.5
(Inlay part)
R≦1
ℓ -0.01 -0.02
d2
d1
H
0～0.15
G±10′
t
t2 +0.02 0
T -0.1 -0.3
(t1)
C0.3～0.5
K±10′
R2
ℓ1
L +0.02 0
1.6
6
6.3

■Inlay part H=4mm

H	a	ℓ	ℓ1	d1	d2	t	t1	t2	Part Number Type	Part Number L	T	A	G° 1° increments	K°
4	7	12	18	9.5	5.5	6	10	20	**LBCST**	25	30	38 48 58 68 78 88	5～20	5
								25			35		5～17	
								30			40	48 58 68 78 88 98	5～15	
								35			45		5～13	
	13	19	28	14	9	8		35		40	45	68 78 88 98 108	5～22	5・10
								40			50		5～20	
								45			55		5～19	
								50			60		5～17	

Order

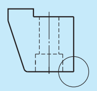
Part Number	T	A	G	K
LBCST25	30	A58	G18	K5

Days to Ship Quotation

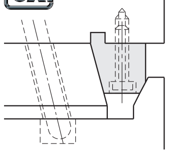
Price Quotation

Alterations

Part Number	T	A	G	K(KN)
LBCST30	35	A58	G18	KN

Alteration	Code	Spec.	1Code
	KN	No processing for beveled bottom	Quotation

Example



■**Feature**

Angle (K) is processed at the opposite side of slide core of locking block, reinforcing locking strength by setting this square part into the digging part of plate.

LOCKING BLOCKS

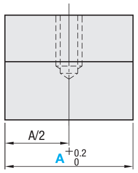
—INLAY TYPE (INLAY PART (E) • ANGLE (G) DESIGNATION)—

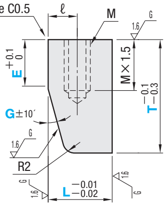
Non JIS material definition is listed on P.1351 - 1352

Part Number	M	H
LBMS	SKS3	53～56HRC
LBMM	HPM2T equivalent	37～41HRC

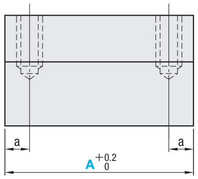
RoHS

A=15～23





A=28～98



a	ℓ	M	Part Number		T	A	E	G°
			Type	L			1mm increments	1° increments
7	7	6	**LBMS** (SKS3) **LBMM** (HPM2T equivalent)	15	20	15 18 23 28 33 38 48	10～13	5～33
					25		10～15	5～33
					30		10～20	5～33
					35	28 33 38 48 58	10～25	5～28
					40		10～30	5～22
8	9	8		20	30	33 38 48 58	10～20	5～33
					35		10～25	5～33
					40	33 38 48 58 68 78	10～30	5～30
					50		12～40	5～24
10	12	10		25	35	38 48 58 68 78	12～25	5～33
					40		12～30	5～33
					50	48 58 68 78	12～40	5～30
12	14	12		30	40	78 88 98	12～30	5～33
					50		12～40	5～33
					60		12～50	5～30

Order

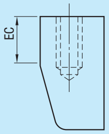
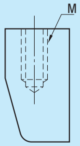
Part Number	—	T	—	A	—	E	—	G
LBMS20	—	40	—	A38	—	E16	—	G21

Days to Ship Quotation

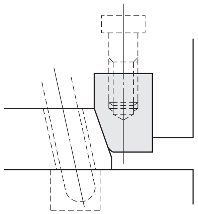
Price Quotation

Alterations

Part Number	—	T	—	A	—	E(EC)	—	G	—	(MC)
LBMS20	—	30	—	A38	—	EC8	—	G15	—	MC6

<table>
<tr><th>Alteration</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td> </td><td>EC</td><td>The designation range of E dimension can be changed.
EC=1mm increments
2≦EC≦9
Applicable sizes
<table><tr><th>L</th><th>T</th></tr><tr><td>15</td><td>20 • 25 • 30</td></tr><tr><td>20</td><td>30 • 35</td></tr></table>
The designation range of G(angle) changes when EC is used.
<table><tr><th>EC</th><th>G°</th></tr><tr><td>2</td><td>5～10</td></tr><tr><td>3</td><td>5～12</td></tr><tr><td>4</td><td>5～14</td></tr><tr><td>5</td><td>5～15</td></tr><tr><td>6</td><td>5～17</td></tr><tr><td>7</td><td>5～19</td></tr><tr><td>8</td><td>5～21</td></tr><tr><td>9</td><td>5～23</td></tr></table></td><td rowspan="2">Quotation</td></tr>
<tr><td> </td><td>MC</td><td>Changes the tap size.
Available for L20 • 25 • 30
Tap length=M×2
<table><tr><th>L</th><th colspan="3">Tap M selection</th></tr><tr><td>20</td><td>6</td><td></td><td></td></tr><tr><td>25</td><td>6</td><td>8</td><td></td></tr><tr><td>30</td><td></td><td>8</td><td>10</td></tr></table></td></tr>
</table>

Example



LOCKING BLOCKS

—INLAY・PL INSTALLATION TYPE—

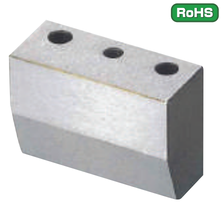
LOCKING BLOCKS WITH ANGULAR HOLE PROCESS

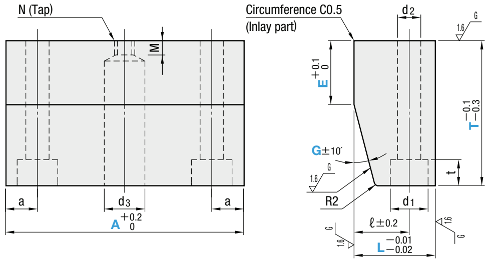
—PL INSTALLATION・WIDTH SPACE SAVING TYPE—

Non JIS material definition is listed on P.1351 - 1352

Part Number	M	H
LBPS	SKS3	53~56HRC
LBPM	HPM2T equivalent	37~41HRC

RoHS





Tap N	M	a	ℓ	d1	d2	d3	t	Part Number Type	L	T	A	E 1mm increments	G° 1° increments	U/Price for 1~9 LBPS(SKS3)	LBPM (HPM2T equivalent)
M5	5	8	14	9.5	5.5	9.5 When A= 33, 5.5	6	LBPS (SKS3) LBPM (HPM2T equivalent)	20	30	33 38 48 58	10~12	5~22	Quotation	
												13~15	5~25		
												16~18	5~29		
												19~20	5~33		
										35		10~12	5~17		
												13~15	5~19		
												16~18	5~22		
												19~20	5~26		
										40	33 38 48 58 68 78	10~12	5~13		
												13~15	5~16		
												16~18	5~18		
												19~20	5~20		
										50		12	5~11		
												13~15	5~12		
												16~18	5~13		
												19~20	5~14		
												21~25	5~15		
												26~30	5~18		
M6 When A= 38, M5	6 When A= 38, 5	10	18	11.5	6.5	11 When A= 38, 5.5	7		25	35	38 48 58 68 78	12	5~26		
												13~15	5~27		
												16~18	5~30		
												19~20	5~33		
										40		12	5~21		
												13~15	5~22		
												16~18	5~25		
												19~20	5~28		
										50	48 58 68 78	12~15	5~16		
												16~18	5~17		
												19~20	5~19		
										60		12	5~12		
												13~15	5~13		
												16~20	5~14		
												21~25	5~15		
												26~30	5~17		

Order

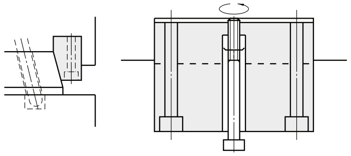
Part Number	—	T	—	A	—	E	—	G
LBPS 20	—	30	—	A33	—	E15	—	G10

Days to Ship Quotation

Price Quotation

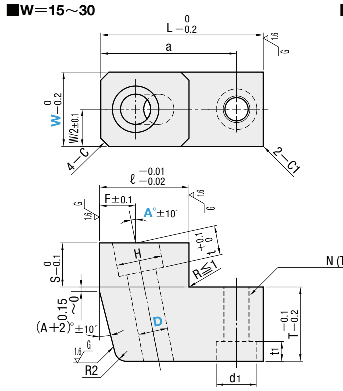
Example

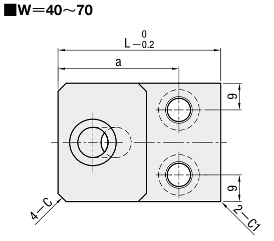
- This locking block can be easily removed by inserting a bolt and jacking up as shown in the figure.



Part Number	M	H
ABPXE	SKS3	53~56HRC
ABPX	SKS3	53~56HRC

RoHS





■a Dimension

D \ W	15~30	45
6	32	—
8		
10	46	
13	—	46

DH7		H	t	Bolt hole d1	Bolt hole t1	Bolt	Tap N	L	T	F	ℓ	S	C	Part Number Type	D	W	A° (Selection)
8	$^{+0.015}_{0}$	13	5	11	6.5	M6	M 8	40	10	10	20	10	3	ABPXE	8	15 20 25	10※ 15 18 20
6	$^{+0.012}_{0}$	11												ABPX (SKS3)	6	20	
8	$^{+0.015}_{0}$	13													8	15 20 25	
10		16	10	14	8.6	M8	M10	55	25	12	30	15	5		10	25 30	
								50								40 45	
13	$^{+0.018}_{0}$	19						55		15	35				13	45 50 55 60 65 70	

※ A 10 is available for ABPX only.

Order

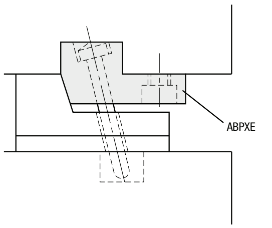
Part Number	—	W	—	A
ABPXE 6	—	15	—	A15

Days to Ship Quotation

Price Quotation

Example

- You can also use a tap to install the block from the plate side. In this case, the size of the tap is the size of the mounting bolt.



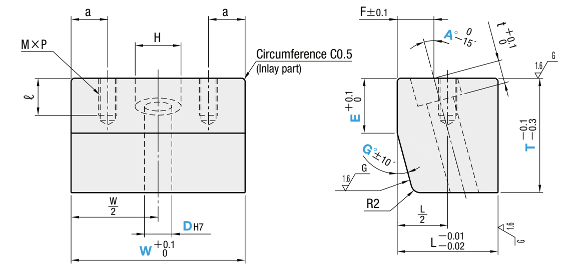
■Features

The S tolerance and (A+2)° tolerance of the ABPX on P.633 have been changed, and the price has been reduced.
If a high-precision type is necessary, please order in the conventional ABPX.

LOCKING BLOCKS WITH ANGULAR HOLES

Compact type P.628

Part Number	M	H
ALBMS	SKS3	53~56HRC


a
a
H
M×P
ℓ
Circumference C0.5
(Inlay part)
W/2
DH7
W +0.1 0
F±0.1
A° 0 −15′
t +0.1 0
E +0.1 0
T −0.1 −0.3
G°±10′
1.6
G
R2
L/2
L −0.01 −0.02

D_{H7}		H	F	ℓ	M×P	t	a	L	Part Number		T	W	E	1° increments		U/Price
									Type	D			1mm increments	A°	G°	1~9
6	$^{+0.012}_{0}$	10	6	8	4×0.7	5	5	20	ALBMS	6	20	38 48 58	10~13	10~20	G≧A+2 and G≦A+5	Quotation
								22			25		10~15			
								25			30		10~20			
8	$^{+0.015}_{0}$	12	8	12	6×1.0	5	6	25		8	20	38 48 58	10~13			
								26			25		10~15			
								30			30		10~20			
10		14	10	16	8×1.25	10	7	32		10	30	38 48 58 68	10~20			
								35			35		10~25			
								36			40		10~30			
								40			50		10~40			
13	$^{+0.018}_{0}$	17	12	16	8×1.25	10	8	40		13	35	48 58 68 78	10~25			
								40			40		10~30			
								45			50		10~40			
								50			60		10~50			

Order

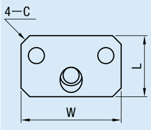
Part Number	—	T	—	W	—	E	—	A	—	G
ALBMS6	—	T25	—	W48	—	E11	—	A15	—	G17

Days to Ship Quotation

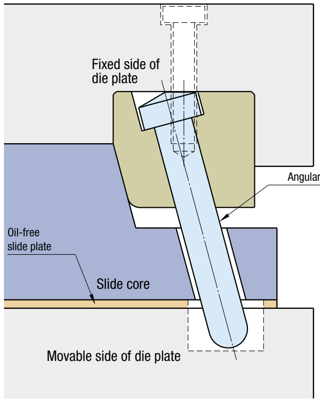
Price Quotation

Alterations

Part Number	—	T	—	W	—	E	—	A	—	G	—	(CC)
ALBMS10	—	T35	—	W48	—	E12	—	A18	—	G20	—	CC

Alteration	Code	Spec.	1Code	
			D6 · 8	D10 · 13
	CC	C chamfering process on 4 outer corners (W · L) D 6, 8: C 3 D 10, 13: C 5	Quotation	

Example


Fixed side of die plate
Angular pin
Oil-free slide plate
Slide core
Movable side of die plate

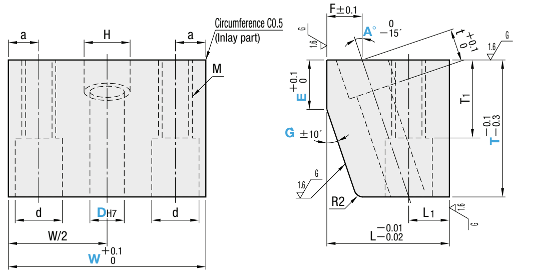
LOCKING BLOCKS WITH ANGULAR HOLES

—PL INSTALLATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

Compact type P.628

Part Number	M	H
ALBPS	SKS3	53~56HRC


a
H
a
Circumference C0.5
(Inlay part)
M
d
DH7
d
W/2
W +0.1 0
F±0.1
A° 0 −15′
t +0.1 0
E +0.1 0
G ±10′
T1
T −0.1 −0.3
1.6
G
R2
L1
L −0.01 −0.02

D_{H7}		H	F	t	T_1	d	M	a	L_1	L	Part Number		T	W	E	1° increments		U/Price
											Type	D			1mm increments	A°	G°	1~9
10	$^{+0.015}_{0}$	14	10	10	20	14	10	9	12	32	ALBPS	10	30	48 58 68	10~20	10~20	G≧A+2 and G≦A+5	Quotation
					25					35			35		10~25			
										36			40		10~30			
										40			50		10~40			
13	$^{+0.018}_{0}$	17	12	10	25	14 When W=48 11	10 When W=48 8	9	14	40		13	35	48 58 68 78	10~25			
										40			40		10~30			
										45			50		10~40			
										50			60	58 68 78	10~50			
16		20	15	13	25	17 When W=58 14	12 When W=58 10	12 When W=58 9	16	40		16	35	58 68 78	10~25			
					30					45			40		10~30			
										50			50		10~40			
										55			60		10~50			
20		24			30					45		20	40	58 68 78	10~30			
										50			50		10~40			
										55			60		10~50			

Order

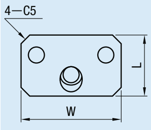
Part Number	—	T	—	W	—	E	—	A	—	G
ALBPS10	—	T30	—	W58	—	E12	—	A15	—	G17

Days to Ship Quotation

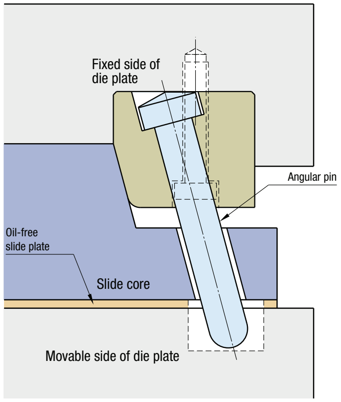
Price Quotation

Alterations

Part Number	—	T	—	W	—	E	—	A	—	G	—	(CC)
ALBPS13	—	T40	—	W68	—	E15	—	A18	—	G20	—	CC

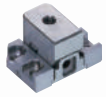
Alteration	Code	Spec.	1Code
	CC	C5 chamfering process on 4 outer corners (W · L)	Quotation

Example

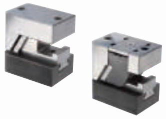

Fixed side of die plate
Angular pin
Oil-free slide plate
Slide core
Movable side of die plate

SLIDE CORES · LOOSE CORES

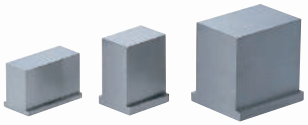
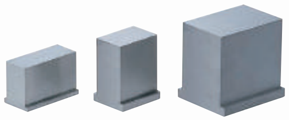
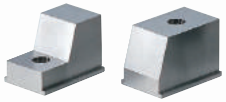
SLIDE CORES LOOSE CORES



Product Name Part Number	Mini Slide Core Units MSCN□	—Inlay part processed— MSCK□	—Tapped— MSCM□	—Slim type · Inlay part processed— MSCSG	—Slim type · Tapped— MSCSGM
Page	634	634	634	637	637



—Slim type with slide core retracting mechanism／Inlay part · Tapped— MSCSB MSCSBM	Slide Core Units for Two-color Injection Mold SCTM	Slide Core Units For Two-color Injection Mold Slide Stroke Amount 6mm SCWM□
638 · 639 · 640	642	644

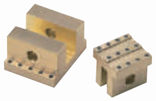
Slide Cores—Standard type— SLG□K SLG□A	Slide Cores—Free designation type— SLF□K SLF□A	Slide Cores with Angular Hole SLFK□□ (X · Y · Z)
645 645	645 645	647

Ball Plungers BPJ BSJ BSZ BSX	Ball Buttons BBT	Ball Plunger Wrenches BPJG	Ball Plungers—Cap type— BPCT
651	651	651	652

Slide Locks SLLK	Ball Plungers—Plain type— BSZP	Ball Plungers—Head type— BSJT	Slide Stoppers SLSP
653	654	654	655

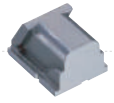
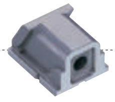
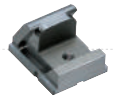
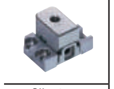
Slide Core Stop Blocks SLNB	Oil-free Slide Units for Loose Core—New standard · Fixing type— SCZN	—New standard · Adjusting type— SCZA	Oil-free Slide Inclined Pin Holders for Loose Core SCZNP SCZAP
656	659	661	663 663

Oil-free Slide Units for Loose Core-Old standard- SCY	Oil-free Slide Inclined Pin Holders For Loose Core KSCNP	Inclined Pins · Direct Push-up Pins K—KSPSA KSPSA	 K—KSPSB KSPSB	 K—KSPSC KSPSC	 K—KSPSD	—Male Thread type— K—KSPSE KSPSE
665	667	669	669	671	671	673



Inclined Pin Leader Oil-free Bushings KPBZ MPBZ	Oil-free Slide Blocks for Block Loose Core SCK
675 675	676

GUIDE FOR MINI SLIDE CORE UNITS

Type	Angular cams M D H2F H 40±2HRC S Nitrided (1000HV～)	Guide rails		Slide cores			Slide stroke amount	Page
		Guide type M DH2F H 40±2HRC S Nitrided (1000HV～)	Slide core retracting mechanism	No processing M DH2F H 40±2HRC	Inlay part processed M SKD11 H 58～60HRC	Tapped M SKD11 H 58～60HRC		
Standard Type 		Combined type 	Yes	MSCNB 	MSCKB 	MSCMB 	3mm 6mm 10mm	P.634
		Separate type 	No	MSCNG	MSCKG	MSCMG	3mm 6mm 10mm	
Slim type 		Combined type 	Yes	—	MSCSB 	MSCSBM 	3mm	P.638
							6mm	P.639
							10mm	P.640
			No		MSCSG	MSCSGM	3mm	P.637

■Characteristics

①Space saving

- Allows downsizing of the mold due to the special structure in which the angular cam and the locking block are combined.

②With slide core lock mechanism

- Ball plunger leads to stable operation of the slide core.

③Equipped with slide core retracting mechanism

- Is safe when using along the direction of the gravity due to the incorporation of the spring unit in the unit guide.

④Total cost reduction

- Simple structure and low-cost
- The angular cam, slide core and guide rail comes in a set, which does not require oblique hole boring, resulting in process cost savings. (Please procure the core part via in-house production.)
- Eliminates the complex calculation such as the slide stroke, etc.

⑤Variation

- 3 options are available: amount of slide stroke ST=3・6・10mm.
- Categories of slide cores

No processing	: Free machining at core section is possibe
Inlay processed	: Big core handling is possible
Tapped	: Machining on core is easy

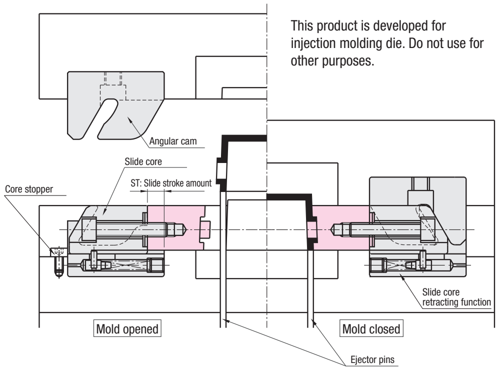
3 types are available.

- Guide rail types:Either separate type (compact) or combined type (no need to adjust guide rail) is available.

⑥Easy maintenance

- Easy to adjust the core part by plate processing as shown in the right figure.

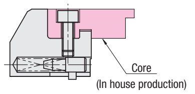
■Example


Angular cam
Slide core
Core stopper
ST: Slide stroke amount
Mold opened
Mold closed
Slide core retracting function
Ejector pins

This product is developed for injection molding die. Do not use for other purposes.

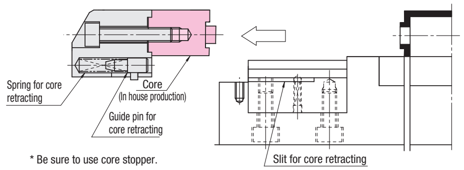
■Slide core retracting function (Patent Acquisition)

Screw cut


Core
(In house production)

Due to the special structure, the core can be easily adjusted by pulling out the slide core without removing the guide rail.

Inlay part processed


Spring for core retracting
Core
(In house production)
Guide pin for core retracting
Slit for core retracting

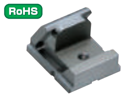
* Be sure to use core stopper.

MINI SLIDE CORE UNITS

—STANDARD TYPE—

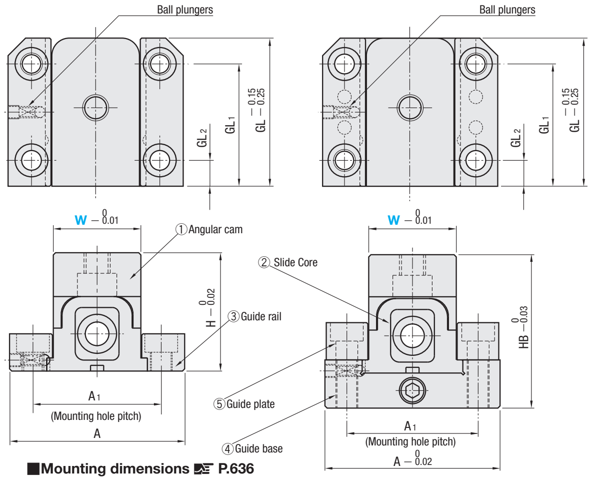
Non JIS material definition is listed on P.1351 - 1352

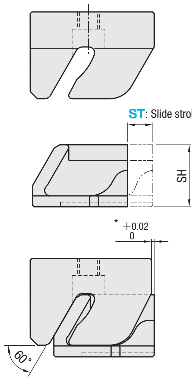
Mini Slide Core Units

Slide core type			Guide type	
MSCN No processing	MSCK Inlay part processed	MSCM Tapped	G Separate type	B Combined type (with slide core retracting mechanism)
RoHS M DH2F H 40±2HRC	RoHS M SKD11 H 58～60HRC	RoHS  M SKD11 H 58～60HRC	RoHS M DH2F H 40±2HRC S Nitrided (1000HV～)	RoHS M DH2F H 40±2HRC S Nitrided (1000HV～)

■Guide type G separate type

■Guide type B combined type


Ball plungers
Ball plungers
GL2
GL1
$GL^{-0.15}_{-0.25}$
$W^{\ 0}_{-0.01}$
$W^{\ 0}_{-0.01}$
①Angular cam
② Slide Core
③Guide rail
⑤Guide plate
④Guide base
$H^{\ 0}_{-0.02}$
$HB^{\ 0}_{-0.03}$
A1
(Mounting hole pitch)
A
$A^{\ 0}_{-0.02}$


ST: Slide stroke amount
SH
$*^{+0.02}_{\ 0}$
60°

$*^{+0.02}_{\ 0}$ is the precision of units. Note that the precision will change according to assembling.

■Component details and page

① Angular cams	P.635
② Slide cores	
③ Guide rails	P.636
④ Guide base	
⑤ Guide plate	

■Mounting dimensions P.636

A	A_1	GL	GL_1	GL_2	H	HB	SH	Part Number		ST	W
								Type	Guide type		
28	22	20	15	5	18	24	10	MSCN (No processing) MSCK (Inlay part processed) MSCM (Tapped)	G (Separate type) B (Combined type)	3	12
40	30	34	28	6	27	35	17			6	20
42	32	50	40	10	40	50	25			10	22
52	42										32

■Components (Single Items) (Be sure to carry out installation adjustment before use.)

Component	Part Number	ST	W
①Angular cams	MSCC	3	12
		6	20
		10	22
		10L	32

Order

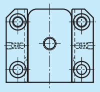
Part Number		ST	—	W
Type	Guide type			
MSCK	B	6	—	20
MSCC		6	—	20

Days to Ship Quotation

Price Quotation

Alterations

Part Number	ST	—	W	—	(SPC・BPW)
MSCKB	10	—	32	—	SPC

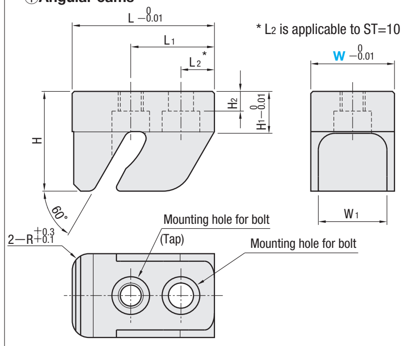
Alterations	Code	Spec.	1Code
Strengthening of core retracting spring	SPC	Alterations on spring (WLH→SWC) and core retracting guide pins Spring: WLH6—30 ⇨ SWC6—30 Load (N) min.: 4.3 ⇨ 7.7 Load (N) max.: 14.6 ⇨ 26.3 Only applicable to ST=10	Quotation
	BPW	Ball plungers are machined on both sides of the guide rail.	

MINI SLIDE CORE UNITS

—STANDARD TYPE・COMPONENTS—

Non JIS material definition is listed on P.1351 - 1352

①Angular cams



L −0.01
L1
L2 *
H2
H1−0.01
H
60°
2−R +0.3 +0.1
Mounting hole for bolt
(Tap)
Mounting hole for bolt
W −0.01
W1

* L2 is applicable to ST=10 only.

M DH2F
H 40±2HRC
S Nitrided (1000HV∼)

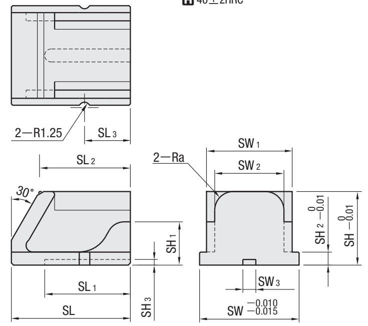
■Angular cams

ST	W	L	L1	L2	W	W1	H	H1	H2	R	Tap	Installation bolt
3	**12**	20	10	—	12	9	15.3	8	3.7	3	M5	M4
6	**20**	34	18	—	20	16.4	23.8	10	4.7	4	M6	M5
10	**22**	50	26	10	22	17.4	36.3	15	8.7	5	M8	M6
	32				32	27						

②Slide cores

N Slide cores not processed

M DH2F
H 40±2HRC



2−R1.25
SL3
SL2
2−Ra
SW1
SW2
30°
SH2 −0.01
SH −0.01
SH1
SL1
SL
SH3
SW3
SW −0.010 −0.015

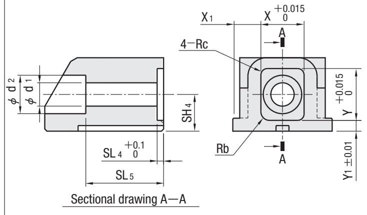
■Slide cores

ST	W	Common												
		SL	SL1	SL2	SL3	SW	SW1	SW2	SW3	SH	SH1	SH2	SH3	Ra
3	**12**	16.6	12.5	13.2	6.6	14.4	11.8	8.6	1.7	10	6.2	2.5	1	2.3
6	**20**	27.5	19.8	21	10.6	23	19.8	16	3	17	10	3	1.3	4.3
10	**22**	39.5	28.6	27.6	14.6	25	21.8	17	3.6	25	16	3.5	1.5	5.3
	32					35	31.8	26.6						

N: Apply nitriding on slide cores not processed after machining.
(for improvement of wear resistance and burning resistance)

K Slide cores with inlay part processed

M SKD11
H 58∼60HRC



X1
X +0.015 0
4−Rc
A
ϕd2
ϕd1
SH4
+0.015 0
Y
SL4 +0.1 0
SL5
Rb
A
Y1 ±0.01

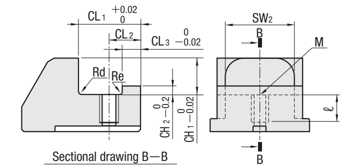
Sectional drawing A−A

ST	W	Alterations										
		Rb	Rc	X1	X	Y1	Y	SH4	SL4	SL5	d1	d2
3	**12**	1.5	1	4.4	5.6	1.5	7	5	1.5	11	3.3	5.8
6	**20**	2	1.5	6.5	10	2.5	12	8.5	1.5	18	5.4	8.9
10	**22**	2.5	2	6.5	12	3.5	18	12.5	1.7	23	6.4	10.4
	32			7.5	20							

K: Mount a core part procured via in-house production on inlay parts of slide cores with bolts.

M Tapped

M SKD11
H 58∼60HRC



CL1 +0.02 0
CL2
CL3 −0.02
SW2
B
M
Rd
Re
CH2 −0.02
CH1 −0.02
ℓ
B

Sectional drawing B−B

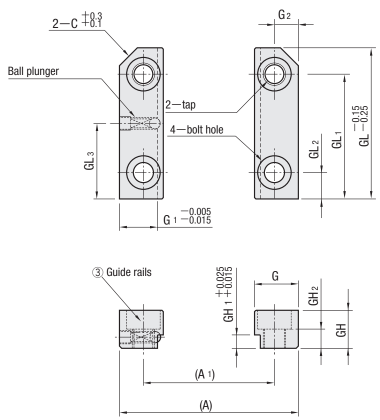
ST	W	SW2	Tapped								
			CL1	CL2	CL3	CH1	CH2	Rd	Re	M	ℓ
3	**12**	8.6	9	5	2.5	6	1.5	1	0.3	M3	4
6	**20**	16	15	8	4	10	2.5		0.5	M4	5
10	**22**	17	18	10	5	15	3		0.5	M5	8
	32	26.6									

Mount a core part procured via in-house production on inlay parts of slide cores with bolts.

Note that core section will contact with angular cam blade if it is larger than SW2.

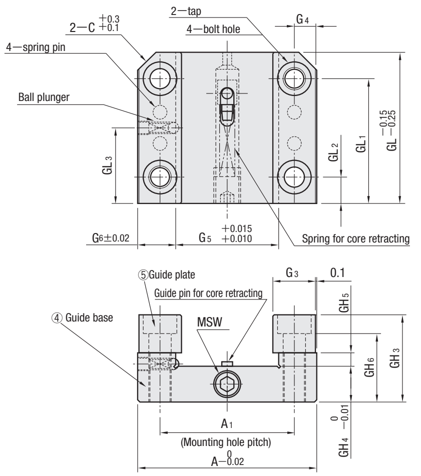
③ Guide rails
④ Guide bases
⑤ Guide plates

G Separate type



2−C +0.3 +0.1
Ball plunger
G2
2−tap
4−bolt hole
GL3
GL2
GL1
GL −0.15 −0.25
G1 −0.005 −0.015
③Guide rails
GH1 +0.025 +0.015
G
GH2
GH
(A1)
(A)

B Combined type



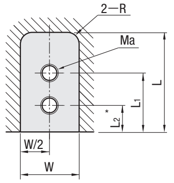
2−C +0.3 +0.1
2−tap
4−bolt hole
G4
4−spring pin
Ball plunger
GL3
GL2
GL1
GL −0.15 −0.25
G6±0.02
G5 +0.015 +0.010
Spring for core retracting
⑤Guide plate
Guide pin for core retracting
G3
0.1
④Guide base
MSW
GH5
GH6
GH3
A1
(Mounting hole pitch)
A−0.02
GH4 −0.01

M DH2F
H 40±2HRC
S Nitrided (1000HV∼)

■Guide type

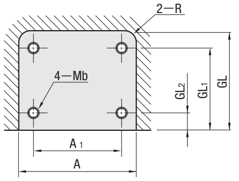
ST	W	③ Guide rails ④ Guide bases ⑤ Guide plates																										
		Common									③ Guide rails						④ Guide bases ⑤ Guide plates											
		A	A1	GL	GL1	GL2	GL3	Tap	Installation bolt	C	G	G1	G2	GH	GH1	GH2	G3	G4	G5	G6	GH3	GH4	GH5	GH6	Spring pin	MSW	Spring for core retracting	Load [N] min.	Load [N] max.
3	**12**	28	22	20	15	5	10	M4	M3	3	7.8	6.8	3.0	7.5	2.5	4.3	7.7	3	14.4	6.8	13.5	6	2.5	10.3	ϕ1.5×10	—	Special spring	4	7.5
6	**20**	40	30	34	28	6	17	M5	M4	4	9.8	8.5	5.0	8.5	3		9.7	5	23	8.5	19.5	8	3	15.3	ϕ3 ×14	M6	WLH5−20	3.7	9.9
10	**22**	42	32	50	40	10	25			5				9	3.5	4.8			25		22.5	10	3.5	18.3	ϕ3 ×16	M8	WLH6−30 *	4.3	14.6
	32	52	42																35										

■Mounting dimensions



2−R
Ma
L
L1
L2 *
W/2
W

—Angular cam side—



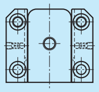
2−R
4−Mb
GL2
GL1
GL
A1
A

—Slide core side—

*L2 dimension is only applicable to ST=10.

ST	W	Fixed die					Movable side						
		L	L1	L2	Ma	R	A	A1	GL	GL1	GL2	Mb	R
3	12	20	10	—	M4	3	28	22	20	15	5	M3	3
6	20	34	18	—	M5	4	40	30	34	28	6	M4	4
10	22	50	26	10	M6	5	42	32	50	40	10		5
	32						52	42					

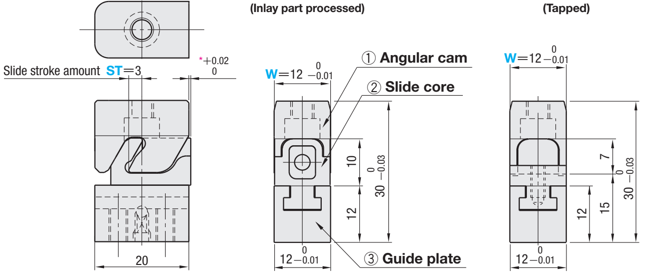
* Springs for core retracting WLH6-30: When ST=10, core retracting load can be strengthened by applying alteration option "SPC".

Alterations	Code	Spec.	1Code
Strengthening of core retracting spring	SPC	Alterations on spring (WLH→SWC) and core retracting guide pins Spring | WLH6−30 | ⇨ | SWC6−30 Load (N) min. | 4.3 | 7.7 Load (N) max. | 14.6 | 26.3 Only applicable to ST=10	Quotation
	BPW	Ball plungers are machined on both sides of the guide rail.	

MINI SLIDE CORE UNITS (SLIDE STROKE AMOUNT 3mm)

—SLIM TYPE—

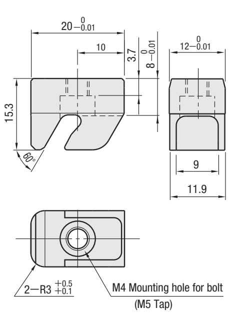
RoHS



MSCSG3—12
(Inlay part processed)
MSCSGM3—12
(Tapped)
Slide stroke amount ST=3
*+0.02 0
W=12 0 −0.01
① Angular cam
② Slide core
③ Guide plate
W=12 0 −0.01
10
30 0 −0.03
12
20
12 0 −0.01
7
12
15
30 0 −0.03
12 0 −0.01

*$^{+0.02}_{0}$ is the precision of units. Note that the precision will change according to assembling.

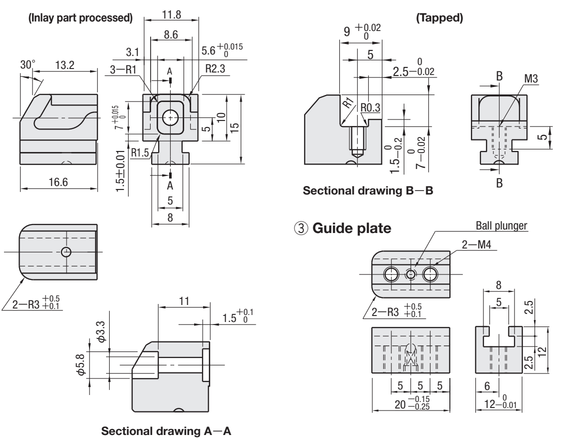
① Angular Cam



20 0 −0.01
10
3.7
8 0 −0.01
12 0 −0.01
15.3
60°
9
11.9
2—R3 +0.5 +0.1
M4 Mounting hole for bolt
(M5 Tap)

② Slide Core

③ Guide plate



(Inlay part processed)
(Tapped)
11.8
8.6
3.1
5.6 +0.015 0
30°
13.2
3—R1
A
R2.3
7 +0.015 0
5
10
15
R1.5
1.5±0.01
16.6
A
5
8
9 +0.02 0
5
2.5 0 −0.02
R1
R0.3
1.5 0 −0.2
7 0 −0.02
B
M3
5
B
Sectional drawing B—B
2—R3 +0.5 +0.1
11
1.5 +0.1 0
φ3.3
φ5.8
Sectional drawing A—A
Ball plunger
2—M4
2—R3 +0.5 +0.1
8
5
2.5
2.5
12
5 5 5
20 −0.15 −0.25
6
12 0 −0.01

Number	Product name	M	H	S
①	Angular Cams	DH2F	38～42HRC	Nitrided (1000HV～)
②	Slide Cores	SKD11	58～60HRC	—
③	Guide plates	DH2F	38～42HRC	Nitrided (1000HV～)

Part Number		W
Type	ST	
MSCSG (Inlay part processed) **MSCSGM** (Tapped)	3	12

■Components (Single Items) (Be sure to carry out installation adjustment before use.)

Components	Part Number		W
	Type	ST	
①Angular cams	MSCC	3	12

Order

Part Number		—	W
Type	ST		
MSCSG	3	—	12
MSCC	3	—	12

Days to Ship: Quotation

Price: Quotation

■Characteristics

①Space saving

- Saves installation space by 50% compared to MSCN☐ and MSCK☐ due to the structural change of the guiding method.

②With slide core lock mechanism

- Ball plunger leads to stable operation of the slide core.

③Installation method can be selected between the two installation methods for core section.

④Total cost reduction

- Simple structure and low-cost.
- The angular cam, slide core and guide plate come in a set, which does not require oblique hole boring, resulting in process cost savings. (Please procure the core part via in-house production.)
- Eliminates the complex calculation such as the slide stroke, etc.

■Notes

- This product is developed for injection molding die. Do not use for other purposes.
- Be sure to apply grease to the sliding surface to prevent it from burning.

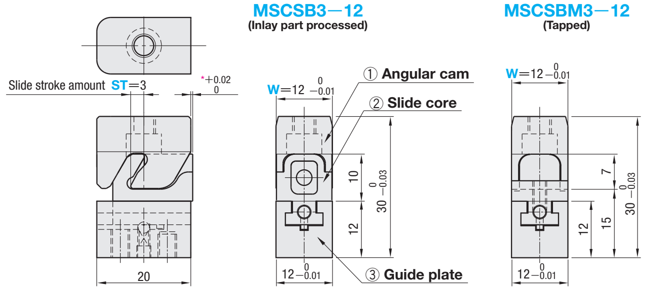
■Mounting dimensions P.638

MINI SLIDE CORE UNITS (SLIDE STROKE AMOUNT 3mm)

—SLIM TYPE WITH SLIDE CORE RETRACTING MECHANISM—

Non JIS material definition is listed on P.1351 - 1352

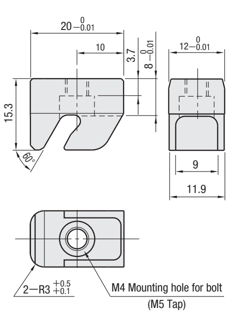
RoHS



MSCSB3—12
(Inlay part processed)
MSCSBM3—12
(Tapped)
Slide stroke amount ST=3
*+0.02 0
W=12 0 −0.01
① Angular cam
② Slide core
③ Guide plate
W=12 0 −0.01
10
30 0 −0.03
12
20
12 0 −0.01
7
12
15
30 0 −0.03
12 0 −0.01

*$^{+0.02}_{0}$ is the precision of units. Note that the precision will change according to assembling.

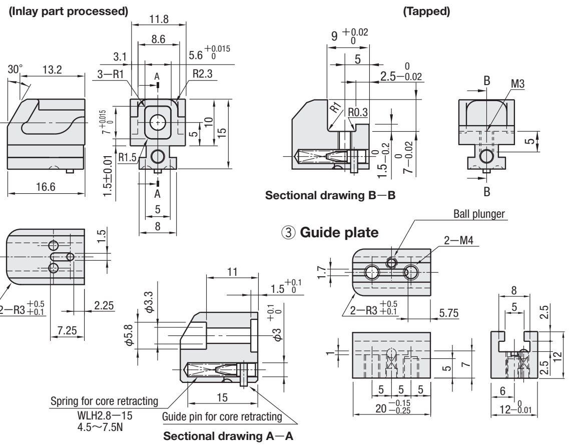
① Angular Cam



20 0 −0.01
10
3.7
8 0 −0.01
12 0 −0.01
15.3
60°
9
11.9
2—R3 +0.5 +0.1
M4 Mounting hole for bolt
(M5 Tap)

② Slide Core

③ Guide plate



(Inlay part processed)
(Tapped)
11.8
8.6
3.1
5.6 +0.015 0
30°
13.2
3—R1
A
R2.3
7 +0.015 0
5
10
15
R1.5
1.5±0.01
16.6
A
5
8
9 +0.02 0
5
2.5 0 −0.02
R1
R0.3
1.5 0 −0.2
7 0 −0.02
B
M3
5
B
Sectional drawing B—B
Ball plunger
1.5
2—R3 +0.5 +0.1
2.25
7.25
φ3.3
φ5.8
11
1.5 +0.1 0
1 +0.1 0
φ3
15
Spring for core retracting
WLH2.8—15
4.5～7.5N
Guide pin for core retracting
Sectional drawing A—A
2—M4
1.7
2—R3 +0.5 +0.1
5.75
1
5
7
5 5 5
20 −0.15 −0.25
8
5
2.5
2.5
12
6
12 0 −0.01

Number	Product name	M	H	S
①	Angular Cams	DH2F	38～42HRC	Nitrided (1000HV～)
②	Slide Cores	SKD11	58～60HRC	—
③	Guide Plates	DH2F	38～42HRC	Nitrided (1000HV～)

Part Number		W
Type	ST	
MSCSB (Inlay part processed) **MSCSBM** (Tapped)	3	12

■Components (Single Items) (Be sure to carry out installation adjustment before use.)

Components	Part Number		W
	Type	ST	
①Angular Cams	MSCC	3	12

Order

Part Number		—	W
Type	ST		
MSCSB	3	—	12
MSCC	3	—	12

Days to Ship: Quotation

Price: Quotation

■Characteristics

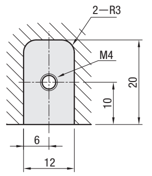
This product is MSCSG3—12, MSCSGM3—12 with side core retracting mechanism.

Built-in spring unit into the slide core enables to move safely even to the direction of gravitational force. Moreover, easy to adjust the core part because the slide cores can be easily detached and attached.

■Notes

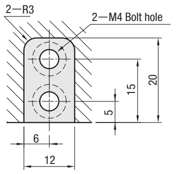
- This product is developed for injection molding die.
  Do not use for other purposes.
- Be sure to apply grease to the sliding surface to prevent it from burning.

■Mounting dimensions



2—R3
M4
20
10
6
12

—Angular cam side—



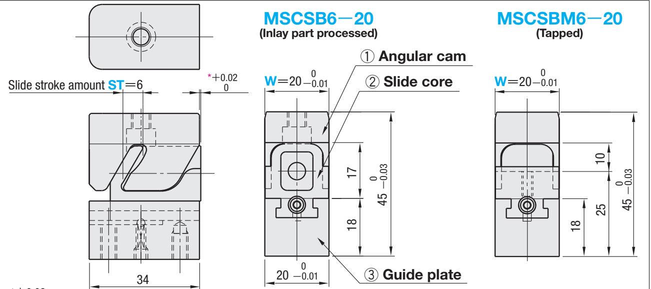
2—R3
2—M4 Bolt hole
20
15
5
6
12

—Slide core side—

MINI SLIDE CORE UNITS (SLIDE STROKE AMOUNT 6mm)

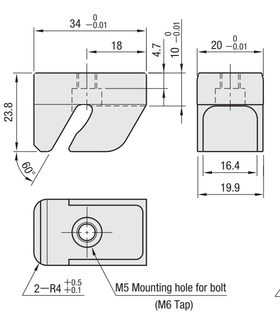
—SLIM TYPE WITH SLIDE CORE RETRACTING MECHANISM—

RoHS

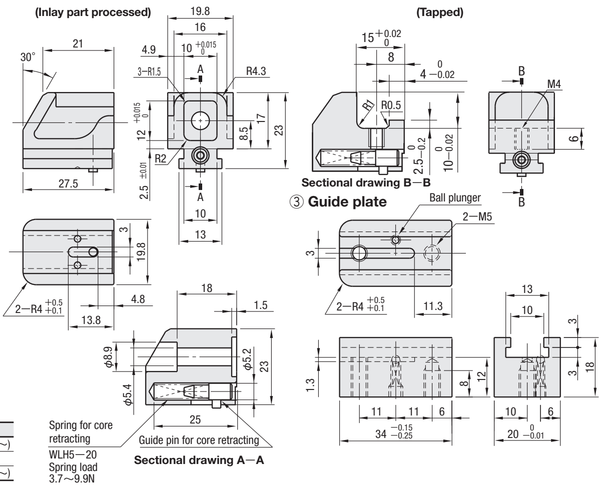

MSCSB6—20
(Inlay part processed)
MSCSBM6—20
(Tapped)
Slide stroke amount ST=6
*+0.02 0
W=20 0 −0.01
① Angular cam
② Slide core
③ Guide plate
17
18
45 0 −0.03
10
25
34
20 0 −0.01

*+0.02 0 is the precision of units. Note that the precision will change according to assembling.

① Angular Cam


34 0 −0.01
18
4.7
10 0 −0.01
20 0 −0.01
23.8
60°
16.4
19.9
2−R4 +0.5 +0.1
M5 Mounting hole for bolt
(M6 Tap)

② Slide Core


(Inlay part processed)
(Tapped)
30°
21
19.8
16
4.9
10 +0.015 0
3−R1.5
A
R4.3
12 +0.015 0
R2
8.5
17
23
2.5 ±0.01
10
13
27.5
15 +0.02 0
8
4 0 −0.02
R1
R0.5
2.5 0 −0.2
10 0 −0.02
Sectional drawing B—B
B
M4
6
③ Guide plate
Ball plunger
2—M5
3
19.8
2−R4 +0.5 +0.1
13.8
4.8
2−R4 +0.5 +0.1
11.3
18
1.5
φ8.9
φ5.2
23
φ5.4
25
Spring for core retracting
WLH5—20
Spring load
3.7～9.9N
Guide pin for core retracting
Sectional drawing A—A
1.3
11
11
6
34 −0.15 −0.25
8
12
13
10
3
3
18
10
6
20 0 −0.01

Number	Product name	M	H	S
①	Angular Cams	DH2F	38～42HRC	Nitrided (1000HV～)
②	Slide Cores	SKD11	58～60HRC	—
③	Guide Plates	DH2F	38～42HRC	Nitrided (1000HV～)

Part Number		W
Type	ST	
MSCSB (Inlay part processed) **MSCSBM** (Tapped)	6	20

■Components (Single Items) Be sure to carry out installation adjustment before use.

Components	Part Number		W
	Type	ST	
①Angular Cams	MSCC	6	20

Order

Part Number			W
Type	ST	—	
MSCSB	6	—	20
MSCC	6	—	20

Days to Ship **Quotation**

Price **Quotation**

■Characteristics

①Equipped with slide core retracting mechanism
- Built-in spring unit into the slide core enables to move safely even to the direction of gravitational force. Moreover, easy to adjust the core part because the slide cores can be easily detached and attached.

②Space saving
- Saves installation space by 50% compared to MSCN□ and MSCK□ due to the structural change of the guiding method.

③With slide core lock mechanism
- Ball plunger leads to stable operation of the slide core.

④Installation method can be selected between the two installation methods for core section.

⑤Total cost reduction
- Simple structure and low-cost.
- The angular cam, slide core and guide plate come in a set, which does not require oblique hole boring, resulting in process cost savings. (Please procure the core part via in-house production.)
- Eliminates the complex calculation such as the slide stroke, etc.

■Notes
- This product is developed for injection molding die.
  Do not use for other purposes.
- Be sure to apply grease to the sliding surface to prevent it from burning.

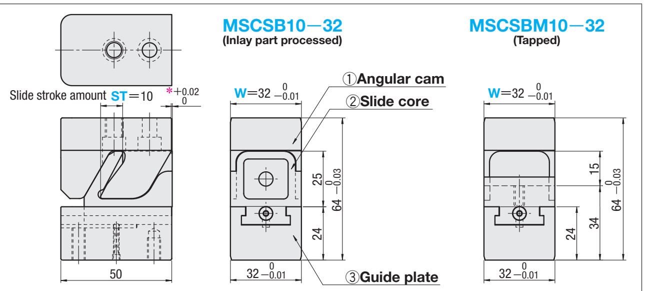
■Mounting dimensions P.640

MINI SLIDE CORE UNITS (SLIDE STROKE AMOUNT 10mm)

—SLIM TYPE WITH SLIDE CORE RETRACTING MECHANISM—

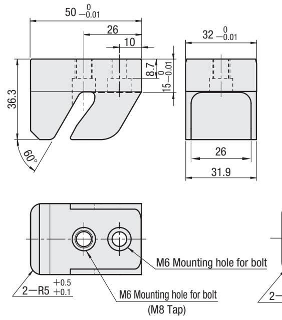
Non JIS material definition is listed on P.1351 - 1352

RoHS

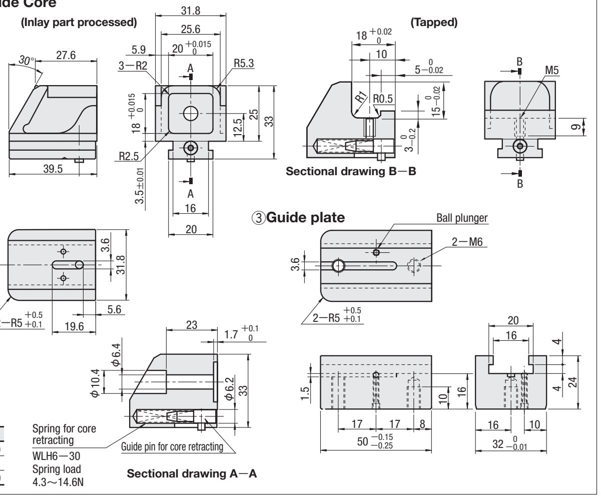

MSCSB10—32
(Inlay part processed)
MSCSBM10—32
(Tapped)
Slide stroke amount ST=10
*+0.02 0
W=32 0 −0.01
①Angular cam
②Slide core
③Guide plate
25
24
64 0 −0.03
15
34
50
32 0 −0.01

*+0.02 0 is the precision of units. Note that the precision will change according to assembling.

①Angular Cam


50 0 −0.01
26
10
32 0 −0.01
8.7
15 0 −0.01
36.3
60°
26
31.9
2−R5 +0.5 +0.1
M6 Mounting hole for bolt
(M8 Tap)

②Slide Core


(Inlay part processed)
(Tapped)
30°
27.6
31.8
25.6
5.9
20 +0.015 0
3−R2
A
R5.3
18 +0.015 0
12.5
25
33
R2.5
3.5 ±0.01
16
20
39.5
18 +0.02 0
10
5 0 −0.02
R1
R0.5
3 0 −0.2
15 0 −0.02
Sectional drawing B—B
B
M5
9
③Guide plate
Ball plunger
2—M6
3.6
3.6
31.8
M6 Mounting hole for bolt
2−R5 +0.5 +0.1
19.6
5.6
2−R5 +0.5 +0.1
23
1.7 +0.1 0
φ6.4
φ10.4
φ6.2
33
Spring for core retracting
WLH6—30
Spring load
4.3～14.6N
Guide pin for core retracting
Sectional drawing A—A
1.5
17
17
8
50 −0.15 −0.25
10
16
20
16
4
24
4
16
10
32 0 −0.01

Number	Product name	M	H	S
①	Angular Cams	DH2F	38～42HRC	Nitrided (1000HV～)
②	Slide Cores	SKD11	58～60HRC	—
③	Guide plates	DH2F	38～42HRC	Nitrided (1000HV～)

Part Number		W
Type	ST	
MSCSB (Inlay part processed) **MSCSBM** (Tapped)	10	32

■Components (Single Items) Be sure to carry out installation adjustment before use.

Components	Part Number		W
	Type	ST	
①Angular Cams	MSCC	10S	32

Order

Part Number			W
Type	ST	—	
MSCSB	10	—	32
MSCC	10S	—	32

Alterations

Part Number	—	W	—	SPC
MSCSBM10	—	32	—	SPC

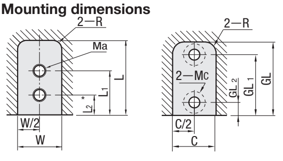
Alteration	Code	Spec.	1Code
Strengthening of core retracting spring	SPC	Alterations on spring (WLH→SWC) and core retracting guide pins	Quotation

Spring		WLH6—30		SWC6—30
Load (N)	min.	4.3	⇨	7.7
	max.	14.6		26.3

Days to Ship **Quotation**

Price **Quotation**

■Mounting dimensions


2−R
Ma
L
L1
*
L2
W/2
W
2−R
2−Mc
GL2
GL1
GL
C/2
C

—Angular cam side— —Slide core side—

*L2 dimension is only applicable to ST=10.

ST	W	Fixed side					Movable side					
		L	L_1	L_2	Ma	R	C	GL	GL_1	GL_2	MC	R
6	20	34	18	—	M5	4	20	34	28	6	For M5	4
10	32	50	26	10	M6	5	32	50	42	8	For M6	5

Mc is the counterbore for bolts from the reverse side.

GUIDE FOR SLIDE CORE UNITS FOR TWO-COLOR INJECTION MOLD

■What is Slide Core Units for Two-color Injection Mold ?

When there is an undercut on the two-color injection molded product processed by outer slide, specially-structured slide core that can keep the undercut part even after the primary molding is necessary. The slide core of such a structure must occupy a larger space than the normal slide core. Also, the design is complicated, and assembly adjustment become difficult.

The slide core unit for two-color injection mold (SCTM) is of a special structure which uses an angular cam and a lock pin. It achieves space saving and facilitates design and assembly adjustment.

■Sequence of operating the slide core unit for two-color injection mold

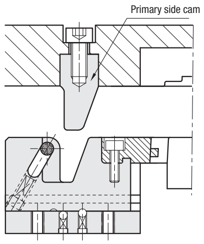
Primary molding

①Mold opening condition
②Mold closing (the slide core is advanced by the primary side angular cam, causing the slide core to lock), and molding of the first color
③Mold opening while the primary molded product (undercut part) is supported

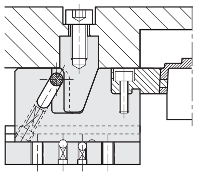
Secondary molding

④The movable side rotates 180° , and then moves to the secondary molding side (replaced by the secondary side angular cam)
⑤During the mold closing process, the secondary side angular cam pushes down the lock pin, preventing the slide core from moving
⑥Mold closing (the slide core is locked by the secondary side angular cam), and molding of the second color
⑦Mold opening (the slide core is retracted to its initial position by the secondary side angular cam), and removal of the molded product

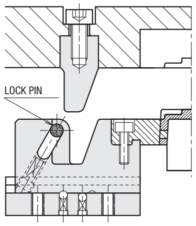
Primary molding


Primary side cam

①Mold Opening

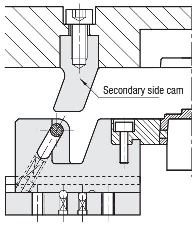


②Mold closing (Slide core moves)
Primary molding

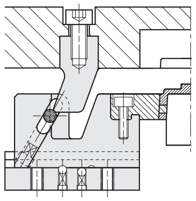


③Mold Opening (Slide core is fixed)

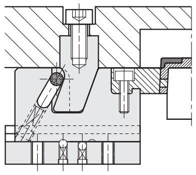
Secondary molding


Secondary side cam

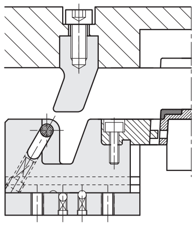
④The movable side mold plate rotates
while the molded product is supported.



⑤Mold closing process
・Lock pin moves
・Slide core is fixed



⑥Secondary molding

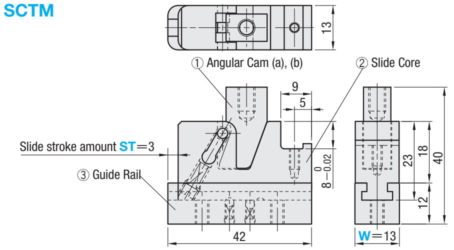


⑦Mold Opening (Slide core moves)

SLIDE CORE UNITS FOR TWO-COLOR INJECTION MOLD

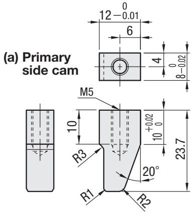
Non JIS material definition is listed on P.1351 - 1352

SCTM

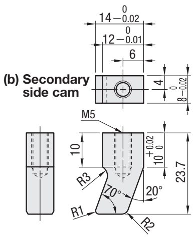

13
① Angular Cam (a), (b)
② Slide Core
9
5
Slide stroke amount ST=3
③ Guide Rail
8−0.02 0
23
18
40
12
42
W=13

① Angular Cam

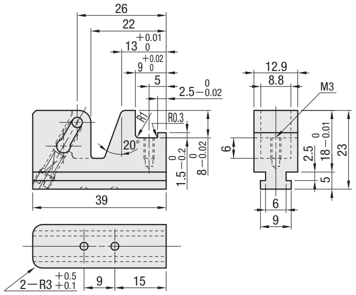
(a) Primary side cam


12−0.01 0
6
4
8−0.02 0
M5
10
10 +0.02 0
23.7
R3
20°
R1
R2

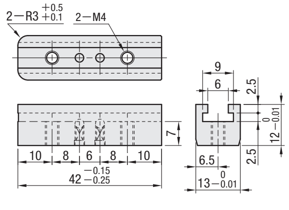
(b) Secondary side cam


14−0.02 0
12−0.01 0
6
4
8−0.02 0
M5
10
10 +0.02 0
23.7
R3
70°
20°
R1
R2

② Slide Core


26
22
13 +0.01 0
9 +0.02 0
5
2.5−0.02 0
R1
R0.3
20°
1.5−0.2 0
8−0.02 0
39
2−R3 +0.5 +0.1
9
15
12.9
8.8
M3
6
2.5
18−0.01 0
23
5
6
9

③ Guide Rail


2−R3 +0.5 +0.1
2−M4
10
8
6
8
10
42 −0.15 −0.25
7
9
6
2.5
12−0.01 0
2.5
6.5
13−0.01 0

No.	Product name	Quantity	M	H	S
①−a	Primary side angular cam	1	SKD11	58～60HRC	—
①−b	Secondary side angular cam	1	SKD11	58～60HRC	—
②	Slide Cores	2	SKD11	58～60HRC	—
③	Guide rails	2	DH2F	38～42HRC	Nitrided (1000HV～)

Part Number		W
Type	ST	
SCTM	3	13

Order

Part Number	—	W
SCTM3	—	13

Days to Ship **Quotation**

Price **Quotation**

■Characteristics

①Compact

A special construction using a lock pin was employed for maximum compactness.

It is possible to reduce the mold size by one rank or more.

②With slide core lock function

Ball plunger leads to stable operation of the slide core.

③Total cost reduction

- The angular cam, slide core and guide rail come in a set, which does not require oblique hole boring, resulting in process cost savings. (Please procure the core part via in-house production.)
- Eliminates the complex calculation such as the slide stroke, etc.

■Notes

- This product is developed for injection molding die. Do not use for other purposes.
- Be sure to apply grease to the sliding surface to prevent it from burning.

SLIDE CORE UNITS FOR TWO-COLOR INJECTION MOLD
—GUIDE—

What is a Two-color Injection Mold ?

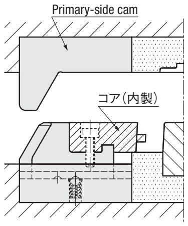
With the advance of molding techniques, two-color injection mold products (using two colors or two types of resin) have become widely used. Their main applications include computer keytops and car stereo light-up buttons. Two-color injection molding generally requires a two-color injection mold and a special die plate with a reverse mechanism. As well, when mold products have an undercut, the slide core structure is complex and requires advanced design. However, with Misumi's SCWM slide core units for two-color injection mold, the diesign and production of die plates for two-color injection molding is simple.

Example of Slide Core Unit for Two-Color Injection Mold SCWM (①+②)

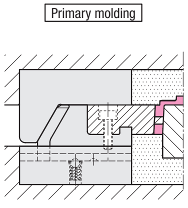
Primary-side cam structure

- Pull the slide core forward with the die plate closed (Fig. II)
- After primary molding, the die plate can be opened with the slide core fixed on the product (Fig. III)

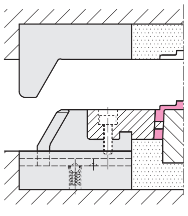
① **SCWMA** (Primary side)


Primary-side cam
コア(内製)

(I) Mold Opening


Primary molding

(II) Mold closing



(III) Mold Opening

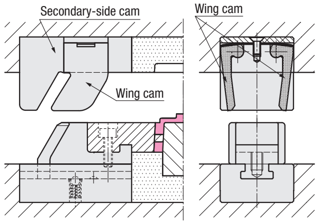
Secondary-side cam structure

The opening and closing wing cam renders two-color injection molding simple.

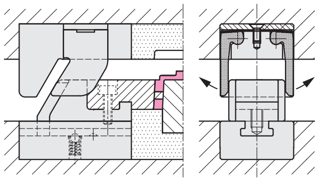
- The die plate can be closed to avoid collisions of the secondary-side cam and slide core (Fig. V)
- Return the slide core when opening the die plate after molding (Fig. VII)

- Because the die plate can be closed with the part embedded in the core, it is also usable for manual insertion molding

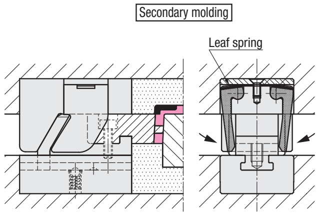
② **SCWMB** (Secondary side)


Secondary-side cam
Wing cam
Wing cam

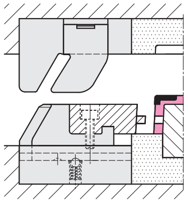
(IV) Replacement with secondary-side cam
Wing cam is closed



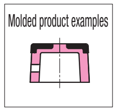
(V) During mold closing
Wing cam spreads outside and prevents slide core collision.
Slide core does not move.


Secondary molding
Leaf spring

(VI) Mold closing
Wing cam returns to its original location



(VII) Mold Opening
Closed wing cam returns the slide core


Molded product examples

Features

Through a special mechanism using an oscillating wing cam, the slide cores for two-color injection molds have been completed.

①Space saving

The die plate can be made a size smaller than existing structures.

②Total cost reduction

- Simple structure means low costs.
- Two-color injection molding becomes possible simply by setting the slide cores. Design time and machining costs can be reduced.
- Eliminates the complex calculation such as the slide stroke, etc.

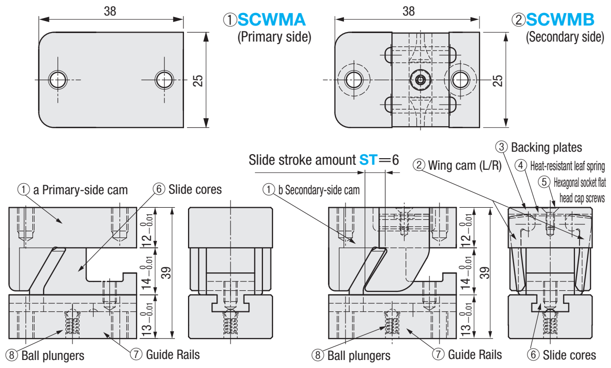
Notes

- This product is developed for injection molding die. Do not use for other purposes.
- Be sure to apply grease to the sliding surface to prevent it from burning.

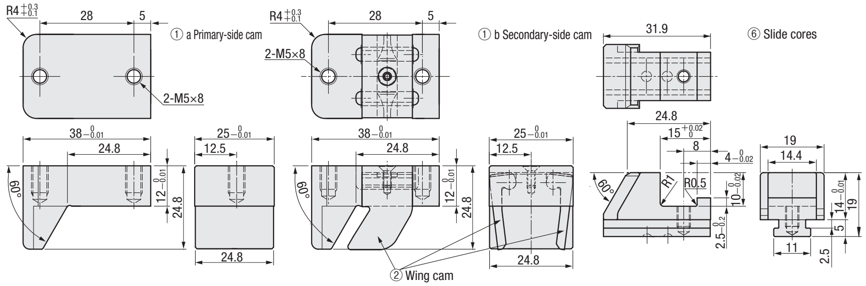
SLIDE CORE UNITS FOR TWO-COLOR INJECTION MOLD SLIDE STROKE AMOUNT 6mm

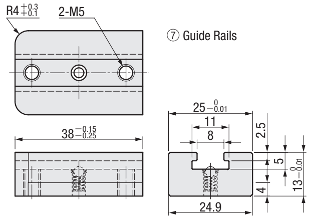
SCWM
①+② Set

①SCWMA
(Primary side)
②SCWMB
(Secondary side)


38
25
①SCWMA
(Primary side)
38
25
②SCWMB
(Secondary side)
Slide stroke amount ST=6
① a Primary-side cam
⑥ Slide cores
$12_{-0.01}^{0}$
$14_{-0.01}^{0}$
$13_{-0.01}^{0}$
39
⑧ Ball plungers
⑦ Guide Rails
① b Secondary-side cam
② Wing cam (L/R)
③ Backing plates
④ Heat-resistant leaf spring
⑤ Hexagonal socket flat head cap screws
⑧ Ball plungers
⑦ Guide Rails
⑥ Slide cores

SCWMA and ⑥⑦⑧ of SCWMB have the same shape


$R4_{+0.1}^{+0.3}$
28
5
① a Primary-side cam
2-M5×8
$38_{-0.01}^{0}$
24.8
60°
$12_{-0.01}^{0}$
24.8
$25_{-0.01}^{0}$
12.5
24.8
$R4_{+0.1}^{+0.3}$
28
5
2-M5×8
① b Secondary-side cam
$38_{-0.01}^{0}$
24.8
60°
$12_{-0.01}^{0}$
24.8
$25_{-0.01}^{0}$
12.5
24.8
② Wing cam
31.9
⑥ Slide cores
24.8
$15_{0}^{+0.02}$
8
$4_{-0.02}^{0}$
60°
R1
R0.5
$10_{-0.02}^{0}$
$2.5_{-0.2}^{0}$
19
14.4
$14_{-0.01}^{0}$
19
5
11
2.5


$R4_{+0.1}^{+0.3}$
2-M5
⑦ Guide Rails
$38_{-0.25}^{-0.15}$
$25_{-0.01}^{0}$
11
8
2.5
5
4
$13_{-0.01}^{0}$
24.9

Part Number		No.	Name	Quantity	M Material	H Hardness	S Surface Treatment
SCWM 6-25 ①+②	①SCWMA 6-25 (primary side)	①a	Primary-side cam	1	Alloy Tool Steel	58～60HRC	—
		⑥	Slide cores	1		58～60HRC	—
		⑦	Guide Rails	1		38～42HRC	Nitrided 1000HV～
		⑧	Ball plungers	1	—	—	—
	②SCWMB 6-25 (secondary side)	①b	Secondary-side cam	1	Alloy Tool Steel	58～60HRC	—
		②	Wing cam (L/R)	1		48～52HRC	—
		③	Backing plates	1		58～60HRC	—
		④	Heat-resistant leaf spring	1	SUS301H		—
		⑤	Countersunk bolt SFB2.5-6	1	SUS304		—
		⑥	Slide cores	1	Alloy Tool Steel	58～60HRC	—
		⑦	Guide Rails	1		38～42HRC	Nitrided 1000HV～
		⑧	Ball plungers	1	—	—	—

Part Number Type	ST	W	U/Price 1～9 units
SCWM (①SCWMA+②SCWMB)	6	25	Quotation
*①**SCWMA** (Primary side)			
*②**SCWMB** (Secondary side)			

Order

Part Number	—	W
SCWM 6	—	25

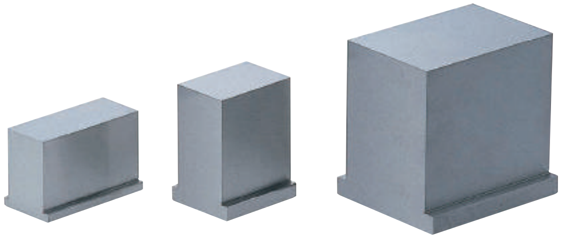
Days to Ship: Quotation

Price: Quotation

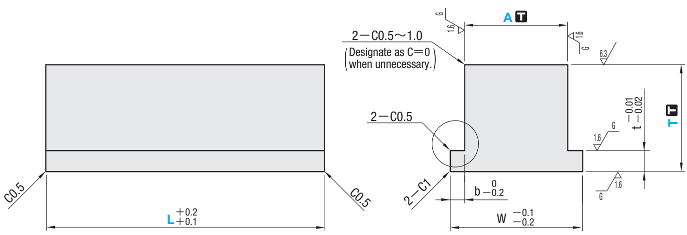
SLIDE CORES

—STANDARD TYPE／FREE DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

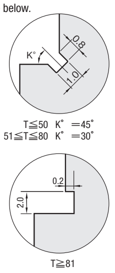


Part Number		M		H	Flange thickness t	Flange width W	One side of flange b	T A dimension	T T dimension
Standard type	Free designation type								
SLG5K	SLF5K	NAK55	Prehardened steel	37～43HRC	t=5	W=A+6	b=3	0 −0.01	+0.1 +0.05
SLG5A	SLF5A	NAK80							
SLG8K	SLF8K	NAK55			t=8	W=A+8	b=4		
SLG8A	SLF8A	NAK80							



About Recessing of Flange

The neck of flange has a recess shown as the figure below.



Order Part Number — A — T — L — (When C is unnecessary)

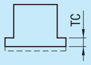
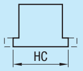
SLF8A — A60 — T48 — L85 — C0

Days to Ship Quotation

Price Quotation

Alterations Part Number — A — T — L — (TC・TKC・HC)

SLF8A — A35 — T40 — L55 — TC6

Alterations	Code	Spec.	1Code
	TC	Reduces the flange thickness. TC=1mm increments TC≧(Flange thickness−2) (Dimension T remains unchanged.)	Quotation
	HC	Reduces the flange width. HC=1mm increments Standard size (W)>HC≧(A+3)	

■Standard A・T dimension selection type

Part Number	A	T	L 1mm increments
Flange thickness 5mm SLG5K (NAK55) SLG5A (NAK80)	20	15 20	20～ 60
	25	25	
		30	
	30	20 25	
		30	
	40	20 25 30	20～ 80
		35	
	50	20 25 30	20～100
		35	
	60	25 30	20～120
		35	
Flange thickness 8mm SLG8K (NAK55) SLG8A (NAK80)	30	25 30	20～ 80
		35	
	40	30	
		35 40	
		45 50	
	50	35 40	20～100
		45 50	
	60	45 50	30～120
		55	

■Free designation type

Part Number	1mm increments		
	A	T	L
Flange thickness 5mm SLF5K (NAK55) SLF5A (NAK80)	10～ 14	10～ 30	10～100
	15～ 30	10～ 60	10～120
	31～ 40	10～ 60	10～160
		61～ 80	60～160
	41～ 50	10～ 60	10～180
		61～ 80	60～180
		81～100	80～180
	51～ 60	10～ 60	10～180
		61～ 80	60～180
		81～100	80～180
		101～120	100～180
	61～ 80	15～ 60	10～180
		61～ 80	60～180
		81～100	80～180
		101～120	100～180
	81～100	20～ 80	60～180
		81～100	80～180
		101～120	100～180
	101～180	30～ 80	60～180
		81～100	80～180
		101～120	100～180

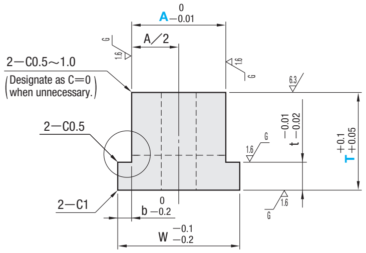
Part Number	1mm increments		
	A	T	L
Flange thickness 8mm SLF8K (NAK55) SLF8A (NAK80)	30～ 40	15～ 60	20～160
		61～ 80	60～160
	41～ 50	15～ 60	20～180
		61～ 80	60～180
		81～100	80～180
	51～ 80	15～ 60	30～180
		61～ 80	60～180
		81～100	80～180
		101～120	100～180
	81～100	20～ 60	30～180
		61～ 80	60～180
		81～100	80～180
		101～120	100～180
	101～180	30～ 80	60～180
		81～100	80～180
		101～120	100～180

SLIDE CORES WITH ANGULAR HOLE

Non JIS material definition is listed on P.1351 - 1352

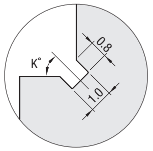
RoHS

Part Number	M		H	Flange thickness	Flange width	One side of flange
SLFK5A	NAK80	Prehardened steel	37~43HRC	t=5	W=A+6	b=3
SLFK8A	NAK80			t=8	W=A+8	b=4


A $^{0}_{-0.01}$
A/2
2−C0.5~1.0
(Designate as C=0 when unnecessary.)
2−C0.5
2−C1
b $^{0}_{-0.2}$
W $^{-0.1}_{-0.2}$
t $^{-0.01}_{-0.02}$
T $^{+0.1}_{+0.05}$
1.6
6.3
G

About Recessing of Flange

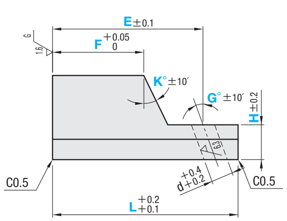
The neck of flange has a recess shown as the figure below.



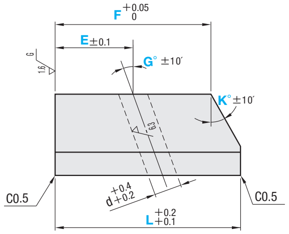
T≦50 K° =45°
51≦T≦60 K° =30°

Shape

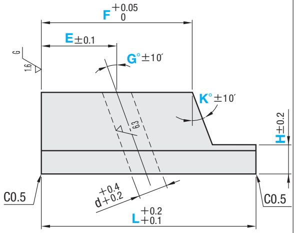
X


E±0.1
F $^{+0.05}_{0}$
K°±10′
G°±10′
H±0.2
d $^{+0.4}_{+0.2}$
L $^{+0.2}_{+0.1}$
C0.5
C0.5
1.6
6.3
G

Y


F $^{+0.05}_{0}$
E±0.1
G°±10′
K°±10′
d $^{+0.4}_{+0.2}$
L $^{+0.2}_{+0.1}$
C0.5
C0.5
1.6
6.3
G

Z


F $^{+0.05}_{0}$
E±0.1
G°±10′
K°±10′
H±0.2
d $^{+0.4}_{+0.2}$
L $^{+0.2}_{+0.1}$
C0.5
C0.5
1.6
6.3
G

Part Number		1mm increments			(*1) D	E	G°
Type	Shape	A	T	L	Applicable angular pin dia.	0.1mm increments	1° increments
Flange thickness 5mm **SLFK5A** (NAK80)	X	15~ 20	15~30	10~ 40	4 5 6 8	Shape **X** min. $E>F+(T-H)\tan K+3+\frac{d}{2}\times\frac{1}{\cos G}$ Shape **X** max. $E<L-3-H\times\tan G-\frac{d}{2}\times\frac{1}{\cos G}$ Shape **Y** min. $E>3+\frac{d}{2}\times\frac{1}{\cos G}$ Shape **Y** max. $E<L-3-T\times\tan G-\frac{d}{2}\times\frac{1}{\cos G}$ Shape **Z** min. $E>3+\frac{d}{2}\times\frac{1}{\cos G}$ Shape **Z** max. $E<F-3-\frac{d}{2}\times\frac{1}{\cos G}$	10~30
		21~ 30	15~40	10~ 60	6 8 10		
		31~ 40	20~50	10~ 80	8 10 12 13 15 16		
		41~ 50	20~60	10~100	10 12 13 15 16 20		
		51~ 80	25~60	10~120	12 13 15 16 20 25		
	Y	81~100	30~60				
Flange thickness 8mm **SLFK8A** (NAK80)		30~ 40	20~50	20~ 80	8 10 12 13 15 16		
	Z	41~ 50	20~60	20~100	10 12 13 15 16 20		
		51~ 60	25~60	30~120	12 13 15 16 20 25		
		61~ 80	25~60				
		81~100	30~60				

Part Number	F 0.1mm increments	K° 1° increments	H 1mm increments
Flange thickness 5mm **SLFK5A** (NAK80)	Shape **X** min. $F>\frac{L}{3}$ Shape **X** max. $F<E-(T-H)\tan K-3-\frac{d}{2}\times\frac{1}{\cos G}$ Shape **Y** min. $F>E+3+\frac{d}{2}\times\frac{1}{\cos G}$ $F>L-T\times\tan K$	10~30	T>H≧5
Flange thickness 8mm **SLFK8A** (NAK80)	Shape **Y** max. $F<L$ Shape **Z** min. $F>E+3+\frac{d}{2}\times\frac{1}{\cos G}$ Shape **Z** max. $F<L-(T-H)\tan K$	G≦K≦G+5	T>H≧8

D	d
4	4.5
5	5.5
6	6.5
8	9
10	11
12	13

D	d
13	14
15	16
16	17
20	21.5
25	26.5

(*1) D is the diameter of an angular pin to be used. The corresponding hole diameter (d) on the slide core will be as shown in the above table.

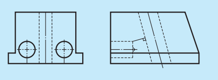
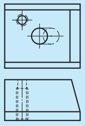
Order

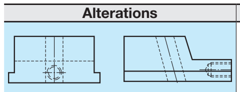
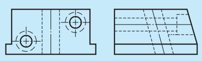
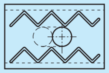
Part Number	—	A	—	T	—	L	—	D	—	E—G—F—K—(H)—(C0)
SLFK8MZ	—	A60	—	T48	—	L85	—	D20	—	E20—G15—F70—K17—H20—C0

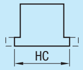
Days to Ship Quotation

Price Quotation

Alterations Details of alterations other than HC P.649
Quotation

Alterations	Code	Spec.
	ZC	**Spring hole machining** **Details P.649**
	BP	**Tapping Details** **P.649**

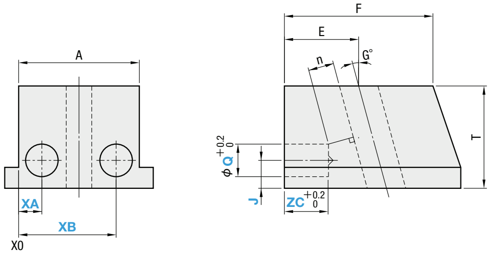
Alterations	Code	Spec.
	VC	**Stop block processing** **Details P.650**
	SC	**Bolt hole boring** **Details P.650**
	AM	**Oil groove machining lower Details** **P.650**

Alterations	Code	Spec.	1Code
 HC	HC	Reduces the flange width. HC=1mm increments Standard size (W)>HC≧(A+3)	Quotation

ALTERATION GUIDE FOR SLIDE CORES WITH ANGULAR HOLE

Spring hole machining

Alteration



Code ZC

Spec.

Available for all shapes.
Adds holes to house push back springs.
Q: Select from the table on the right.

- Specify X coordinate from the slider's front face left edge as X0.
- To order one spring hole, designate the desired XA code and enter 0 for XB.

❢ In order to avoid interference between the spring holes, they must be apart from each other at least 2mm. Up to two holes can be created.

⊗ Combination with BP・VC・SC not available.

Applicable heatproof wire springs P.1231～

Spring	Spring dia.	φQ
WLH WMH WHH	8	9
	10	11
	13	14
	16	17
	18	19

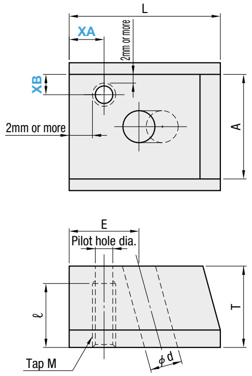
Unit of designation

①ZC＝1mm increments. However n＞5 min. 9～max. φQ×2
How to calculate n
cosG×[E＋{tanG×(TorH－(J＋Q/2))}－ZC]
②J＝1mm increments Jmin.＝Q/2＋2 Jmax.＝T－Q/2－5
③Q＝Select from the upper table on the right.
④XA, XB＝0.5mm increments Q/2＋2≦XA
A/2＋2≦XB＜A－(Q/2)－2

1Code Quotation

Order

Part Number	A	T	L	D	E	G	F	K	H	ZC	J	Q	XA	XB
SLFK8AY	A60	T48	L85	D16	E37	G15	F73	K17		ZC20	J10	Q14	XA14	XB38

Alteration		Code	Spec.	1Code
Tapping		BP	see below	Quotation

Available for all shapes.
Adds a tap hole for a ball plunger.
Applicable ball plungers P.651

Applicable ball plungers	Tap M	Depth ℓ	Range
BPJ BSJ BSZ	M 6	15	ℓ＋2＞T(H) ···→Tapp through hole ℓ＋2≦T(H) ···→Pilot through hole
	M 8	20	
	M10	25	
	M12	30	

Unit of designation

①BP＝Selection (M) from the above table
②XA＝0.5mm increments
XA designation range
min. M/2＋2 ～ max. E－(M/2＋3)
③XB＝0.5mm increments
XB designation range
min.M/2＋2 ～ max.A－(M/2＋3)

Specify XA, XB coordinates from the slider's front face left edge as X0. Only one hole can be created.

⊗ Combination with ZC・VC・SC・AM not available.

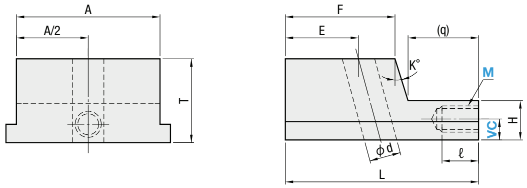
Order

Part Number	A	T	L	D	E	G	F	K	H	BP	XA	XB
SLFK8AY	A60	T48	L85	D16	E30	G15	F73	K17		BP12	XA8.5	XB20.0

Part Number	A	T	L	D	E	G	F	K	H	HC
SLFK8AZ	A60	T48	L85	D20	E20	G15	F70	K17	H20	HC64

Stop block processing

Alteration



Code VC

Spec.

Available for Shape Z only.
Slide Core Stopper Blocks P.656
Note ❢ The range of designation for H in this alteration is as follows.
VC＋2＋M/2≦H＜T
q＞ℓ＋4 How to calculate q: (L－F)－{(T－H)・tanK}

Unit of designation ①VC＝Select from the table on the right (VC).
②M＝Select from the table on the right.

⊗ Combination with ZC・BP・SC not available.

SLNB	BOLT	M×Pitch	ℓ	VC
10－A20	MSB10	M 8×1.25	16	10
10－A30				
13－A20	MSB13	M10×1.5	20	
13－A30				12.5
13－A40				
13－A50				
13－A60				
16－A40	MSB16	M12×1.75	24	
16－A50				
16－A60				

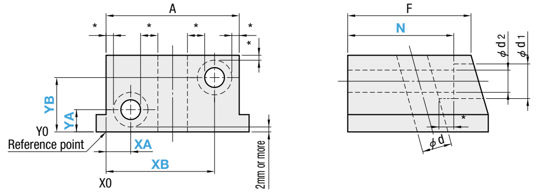
1Code Quotation

Order

Part Number	A	T	L	D	E	G	F	K	H	VC	M
SLFK8AZ	A60	T48	L85	D16	E30	G15	F55	K17	H20	VC10	M8

Bolt hole machining

Alteration



Code SC

Spec.

Available for all shapes.
Adds bolt holes for shaft pins.

Unit of designation ①SC＝Select from the table on the right (M).
②N＝1mm increments 5＜F－N≦8
③XA, YA (coordinates)＝0.5mm increments
④XB, YB (coordinates)＝0.5mm increments

Specify X, Y coordinates from the slider's front face left edge as (X0, Y0).
Designate so that the section marked with * will be 2mm or more.
$(A+d+d_1)/2+2 \leqq XB$
Set YA 1mm or longer than the slide core's head thickness. However it should as follows for Shapes X and Z: $H+d_1/2+2 \leqq YA,YB$

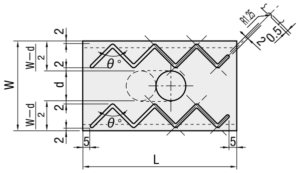
d_1	d_2	Applicable bolt M
9.5	5.5	M5
11	6.5	M6

⊗ C ombination with ZC・BP・VC・AM not available.

1Code Quotation

Order

Part Number	A	T	L	D	E	G	F	K	H	SC	N	XA	YA	XB	YB
SLFK8AY	A60	T48	L85	D16	E30	G15	F73	K17		SC5	N65	XA9.0	YA18.0	XB51.0	XB39.0

Alteration		Code	Spec.	1Code
Adds oil groove for lower surface		AM	see below	Quotation

Available for all shapes.
Adds oil groove for lower surface

❢ $\frac{W-d}{2} \geqq 10$, $L \geqq 40$

❢ L $\frac{W-d}{2}$ ···→ θ° ＝90°
$L \leqq \frac{W-d}{2}$ ···→ θ° ＝60°

Designation method AM

⊗ Combination with BP・SC not available.

Order

Part Number	A	T	L	D	E	G	F	K	H	AM
SLFK8AZ	A60	T48	L85	D16	E30	G15	F55	K17	H20	AM

BALL PLUNGERS

—CAP TYPE—

Non JIS material definition is listed on P.1351 - 1352

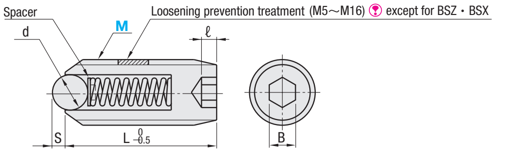
Ball plungers

RoHS

Loosening prevention treatment applied

Loosening prevention treatment not applied

Type		Loosening prevention treatment	Main body M	Main body H	Main body S	Ball M	Ball H	Spring M	Spacers M	Possible temperature of use
For light load	**BPJ**	Yes	S45C	29～35HRC	Black Oxide	SUJ2	55HRC～	SWP—B	SUS304	−30℃～80℃
For heavy load	**BSJ**	Yes	SUS304 (equivalent)	—	—					
Stainless steel for heavy load	**BSZ**	No		—	—	SUS440C		SUS631J1	SUS304	−30℃～260℃
Stainless steel for extra heavy load	**BSX**	No								



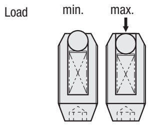
d	S	L	ℓ	B	For light load BPJ Load (N) min.	For light load BPJ Load (N) max.	For heavy load BSJ Load (N) min.	For heavy load BSJ Load (N) max.	For heavy load BSZ Load (N) min.	For heavy load BSZ Load (N) max.	For extra heavy load BSX Load (N) min.	For extra heavy load BSX Load (N) max.	Part Number Type	Part Number M (Coarse thread)
1.0	0.2	5	1.0	0.9	0.7	1.4	—	—	1.2	2.0	—	—	**BPJ** **BSJ** **BSZ** **BSX**	*2
1.5	0.5	7	1.0	1.5	1.0	2.0	1.5	2.9	1.5	2.9	2.2	5.0		3
2.5	0.8	9	1.5	2	2.0	4.9	3.9	9.8	3.9	9.8	2.5	12.5		4
3.0		12	2.0	2.5	2.9	9.8	4.9	19.6	4.9	19.6	11.2	24.1		5
3.0		13	2.5	3	4.9	14.7	9.8	29.4	9.8	29.4	17.7	33.4		6
4.0	1.0	15	2.5	4	6.9	19.6	12.7	39.2	12.7	39.2	21.4	45.3		8
5.0	1.2	16	3.0	5	8.8	24.5	18.6	49.0	18.6	49.0	23.5	60.0		10
7.0	1.8	20	3.0	6	9.8	29.4	19.6	58.8	19.6	58.8	24.1	63.7		12
9.5	2.5	25	3.0	8	15.7	49.0	29.4	98.0	29.4	98.0	43.6	116.3		16

M2・M3・M4 have no groove for the specific wrench (BPJG),so that they can only be installed in hexagonal holes. Moreover they are not applied with loosening prevention treatment. For M5 or higher, use the specific wrench. * M2 is only available for BPJ・BSZ. Load values "min." indicate an initial load, and "max." a load when the ball is fully sunk. Load {kgf}=Load N×0.101972

Order Part Number BPJ12

Days to Ship Quotation

Price Quotation

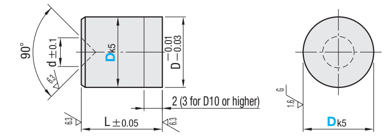


■Ball Buttons

BBT

RoHS

M SK4
H 53～58HRC



Part Number Type	Part Number Dk5		L	d	W (g)
BBT	6	+0.006 +0.001	8	2	2
	8	+0.007 +0.001	10	3	4
	10		12	4	8
	12	+0.009 +0.001	14	5	13
	16		18	8	28

To combine with Ball Plunger, make sure to match their catalog numbers (M=D). (BBT6 is also available for M5)

Order Part Number BBT6

To be quoted on price & lead time above Max. Q'ty.

Days to Ship Quotation

■Ball Plunger Wrenches

BPJG

RoHS

M S45C
H 34～43HRC
S Black Oxide

Applicable M	Part Number
5・6	BPJG 1
8	BPJG 2
10	BPJG 3
12	BPJG 4
16	BPJG 5

Available for M5～M16 of ball plungers (BPJ・BSJ・BSZ・BSX)

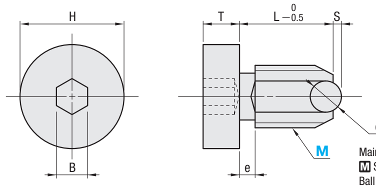
Order Part Number BPJG2

To be quoted on price & lead time above Max. Q'ty.

Days to Ship Quotation

RoHS

BPCT



Main body
M SCM435
Ball
M SUJ2
H 55HRC～
Spring
M SWP—B
Possible temperature of use—30℃～80℃

H	T	B	d	S	L	e	Load (N) min.	Load (N) max.	Part Number Type	Part Number M
6	2.5	2	2.5	0.8	7	*—	5.8	11.7	**BPCT**	4
8	3	2.5	3	0.8	8	*—	5.9	13.8		5
9	3.5	3	3	0.8	9	1.5	7.5	17.6		6
11.5	4	4	4	1	11	2.0	11.6	26.2		8

*There is no relief machining on M4 and M5. Also, there is an incomplete threaded part, so chamfer the tap hole on the mounting side.
Load values "min." indicate an initial load, and "max." a load when the ball is fully sunk. Load {kgf}=Load N×0.101972

Order Part Number BPCT5

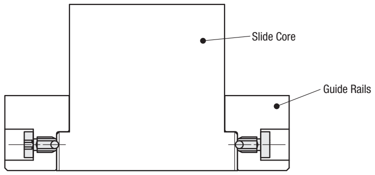
Days to Ship Quotation

Price Quotation

Example

■Feature

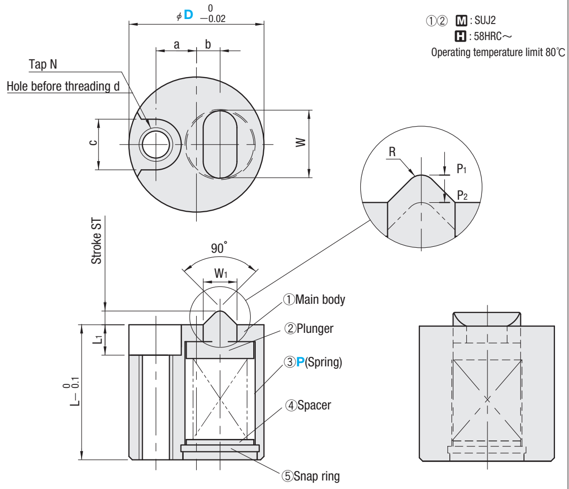
- It is possible to determine the position from the counterbore depth, so there is no need to adjust the plunger when installing it.
- It is possible to install the plunger using a hex-wrench.
- It is recommended that you use the plunger mounted on a guide rail.



SLIDE LOCKS

RoHS

SLLK



①② M : SUJ2
H : 58HRC～
Operating temperature limit 80℃

Load (N)		ST	L	L1	a	b	c	d	Bolt size	Tap N	W	W1	R	Part Number		P (Spring)
P1[min.]	P2[max.]													Type	D	
22.5	28.6	1.6	15	3.3	5	2.5	6	3.2	M3	M4	8	4	1	SLLK	16	C(SWC8—15)
62.0	78.8															F(SWF8—15)
36.7	62.9	2	20	4.5	6	3.5	7.5	4.3	M4	M5	10	5	1.1		20	F(SWF10—15)
64.1	110															L(SWL10—15)

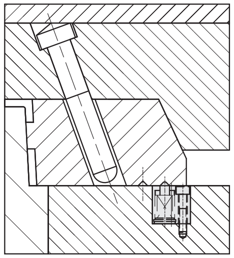
Order

Part Number	—	P
SLLK20	—	L

Days to Ship **Quotation**

Price **Quotation**

Example



■Features This stopper has been developed for a heavy slide core.

- Prevention of damage to the slide core
  A face contact type plunger is used, reducing the face pressure. The resulting structure prevents the core structure from being easily damaged.
- Heavy slides can be locked.

■Precautions

Note that too strong lock load may cause the seizure to the angular pin and the angular cam.
Examples of Countermeasures are as follows:
①Increase the rigidity of the angular pin and angular cam. (Increase the diameter. Reduce the overall length.)
②Reduce the sliding friction. (Chamfering, lubrication)
③Change to a low-load type slide lock.

BALL PLUNGERS

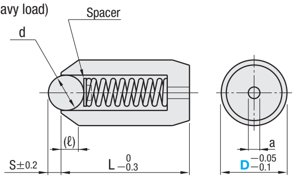
—PLAIN TYPE／HEAD TYPE—

Non JIS material definition is listed on P.1351 - 1352

■Plain type

RoHS

BSZP (Stainless steel for heavy load)



Main body
M SUS304 (equivalent)

Ball
M SUS440C
H 55HRC～

Spring
M SUS631J1

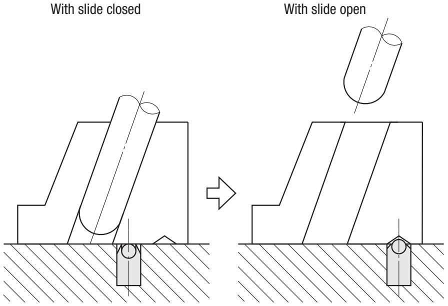
Spacer
M SUS304

Possible temperature of use
—30℃～260℃

d	S	L	(ℓ)	a	Load (N)		Part Number	
					min.	max.	Type	D
3.0	0.8	10	2.2	1.0	4.9	19.6	BSZP	5
		11	2.8		9.8	29.4		6
4.0	1.0	13	3.7	1.5	12.7	39.2		8
5.0	1.2		4.7	2.0	18.6	49.0		10
7.0	1.8	17		3.0	19.6	58.8		12

Load values min." indicate an initial load, and max.", a load when the ball is fully sunk. kgf=N×0.101972

Example



■Characteristics

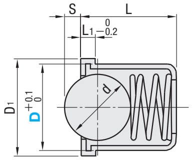
Since it requires no tapping, the process would be simpler.

■Notes

- Measure the L dimension and adjust the counterbore depth of installation hole.
- Installation should be done by inserting into the hole and attach with adhesive. (Do not press-fit because caulking section will be deformed and cause operation failure.)

■Head type

BSJT(Stainless steel for light load)



Main body
M SUS305 (equivalent)

Ball
M Bearing steel (SUJ equivalent)
H 55HRC～

Spring
M SUS301

Possible temperature of use
—30℃～250℃

d	S	L	L1	D1	D1 tolerance	Load (N)		Part Number	
						min.	max.	Type	D
3	0.9	5	1	4.6	±0.1	2.0	5.0	BSJT	4
4	1.0	6	1	5.6		4.0	7.0		5
5	1.5	7	1	6.5	±0.2	6.0	12.0		6
6.5	1.8	9	1	8.5		6.0	12.0		8

Load values "min." indicate an initial load, and "max.", a load when the ball is fully sunk. kgf=N×0.101972

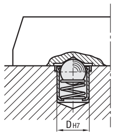
Order

Part Number
BSZP10
BSJT6

Days to Ship **Quotation**

Price **Quotation**

Example



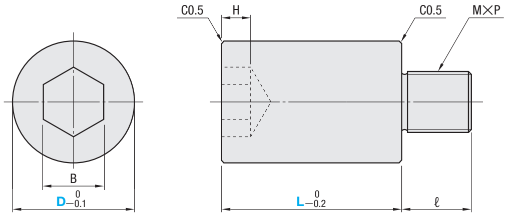
Please press-fit.

SLIDE STOPPERS

SLIDE CORE STOP BLOCKS

Non JIS material definition is listed on P.1351 - 1352

RoHS **SLSP**


C0.5
H
C0.5
M×P
B
D 0/-0.1
L 0/-0.2
ℓ

M S45C
H 33～38HRC
S Black Oxide (Fe_3O_4)

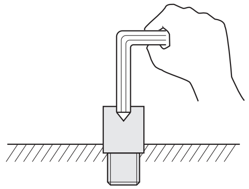
M×P (Coarse thread)	B	H	ℓ	Part Number Type	Part Number D	L					
M 6×1.0	5	4	10	SLSP	10	15	20	25	30		
M10×1.5	8	5	15		16		20	25	30		
M12×1.75	10	6	18		20		20	25	30	35	40
M16×2.0	14	9	24		25				30	35	40

Order Part Number — L
SLSP16 — 20

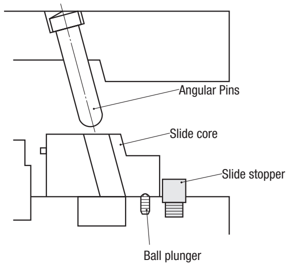
Days to Ship Quotation

Price Quotation

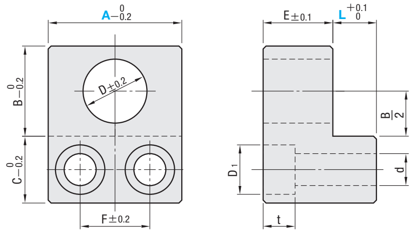
Example



Fix with a hexagonal wrench by inlaying a slide stopper.


Angular Pins
Slide core
Slide stopper
Ball plunger

RoHS **SLNB**


A 0/-0.2
B 0/-0.2
D±0.2
C 0/-0.2
F±0.2
E±0.1
L +0.1/0
B/2
D1
d
t

M S45C

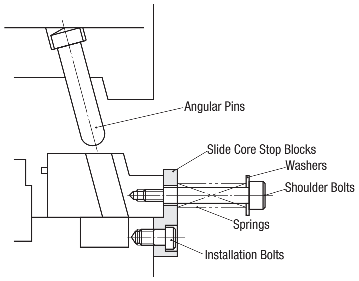
D1	d	t	F	B	C	E	D	Part Number Type	Part Number No.	A	L 1mm increments
9.5	5.5	5.5	10	20	15	15	11	SLNB	10	20	0～30
11	6.5	6.5	15							30	
9.5	5.5	5.5	10				14		13	20	
11	6.5	6.5	15							30	
14	9	9	20	25	20	20				40	0～50
			25							50	
			20				17		16	40	
			25							50	
			30							60	

Order Part Number — A — L
SLNB10 — 30 — L30

Days to Ship Quotation

Price Quotation

Example


Angular Pins
Slide Core Stop Blocks
Washers
Shoulder Bolts
Springs
Installation Bolts

●Applicable Bolts, Springs and Washers

No.	Shoulder Bolts	Springs	Washers	Installation Bolt
10	MSB10	SWU17 SWR17 SWS17 SWN17	SSWA17 SSWA19	A20 →CB5(M5) A30 →CB6(M6)
13	MSB13	SWU21 SWR21 SWS21 SWN21	SSWA24	A20 →CB5(M5) A30 →CB6(M6) A40～60→CB8(M8)
16	MSB16	SWU26 SWR26 SWS26 SWN26	SSWA29	A40～60→CB8(M8)

For shoulder bolt specifications	P.1192
For spring specifications	P.1235～
For washer specifications	P.1198
For bolt specifications	P.1185

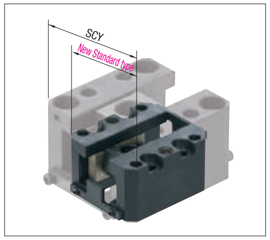
GUIDE FOR OIL-FREE SLIDE UNITS FOR LOOSE CORE

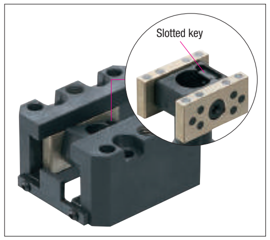
—STANDARD TYPE—

■Characteristics

① Compact

Standard type (SCZN・SCZA) is more compact than SCY.





② Precise and maintenance-free product

- ●Realizes smooth movements of loose cores with high-accuracy process in vertical/horizontal way.
- ●Reducing each clearance between the right and left side to 0.1mm from 0.5mm allows precise core movements.)
- ●When you want to use it with a loose clearance, please make the dowel hole pitch of the mold (size of W_1 in the catalog) 0.5mm-larger than the catalog value with no stopper.)
- ●Further precise rotation of the trunnion unit allows extremely precise movements of the loose core.
- ●Putting solid lubricants in three faces of the slide plate ensures long and stable performance with no oil supply in addition to superior wear resistance/high load capacity/burning resistance. Prior to mounting, please apply grease to the unit in order to protect initial scoring.
- ●Angular pin is prevented from turning with a slotted key with a cubic structure.

③ Easy handling improves production efficiency

●Cleat function

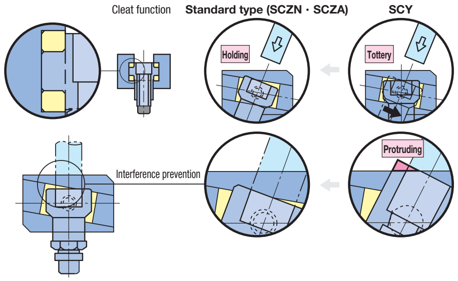
The cleat function is in place in the trunnion unit, which allows an easy insert of the angular pin.

●Interference prevention

The compact angular pin holder prevents interference with the mold when it tilts.

●Wider variation

You can select mounting angle of the slide plate accordinng to the finished product. (**P.659・661**)



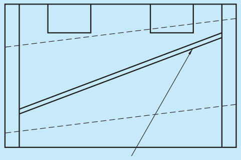
■Characteristics of stopper and slide base

Standard type (SCZN・SCZA) employs the following specification to make installation easier.

Characteristics

①A groove is additionally machined in the side face of the slide base in the same direction as the inclined groove (inner side).

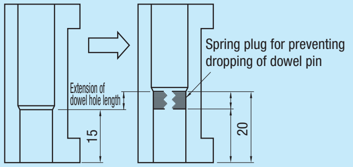
To prevent the unit from being installed on the die with the angle of inclination in reverse, a groove was added to enable the direction of the inclined groove to be checked externally. Note that a groove is not machined in the slide plate (A° = 0).



Groove width 2mm Depth 0

②The length of the slide base dowel hole is extended (D20, 25 and 30 only).

The length of the dowel hole is extended to enable an appropriate effective range for the dowel to be obtained even when a dowel pin drop prevention spring plug is used.


Spring plug for preventing dropping of dowel pin
Extension of dowel hole length
15
20

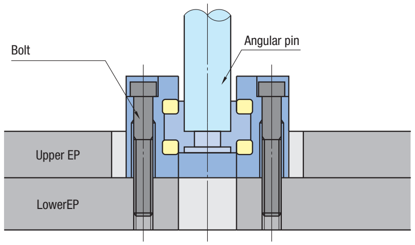
HOW TO MOUNT OIL-FREE SLIDE UNITS FOR LOOSE CORE

■The unit can be mounted from both the upper ejector plate and lower ejector plate.

The unit can be mounted on an ejector plate in two ways: A and B.
Use an appropriate bolt that corresponds to each way.

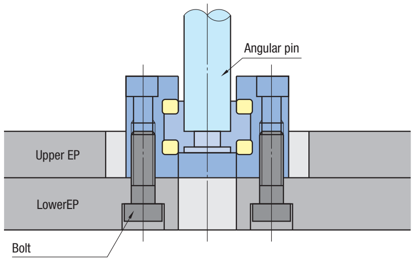
A : Screwing the unit to the ejector plate

・Mounting from the upper side



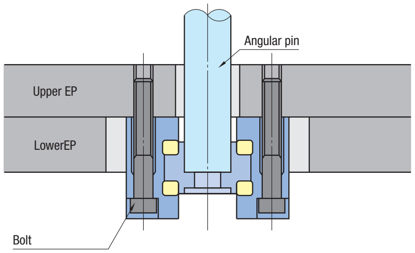
B : Screwing it into the unit

・Mounting from the upper side



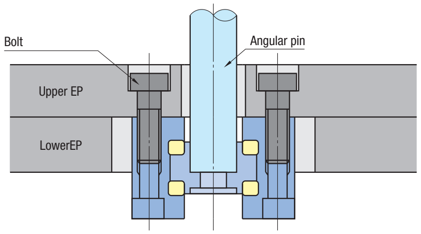
A : Screwing the unit to the ejector plate

・Mounting from the lower side



B : Screwing it into the unit

・Mounting from the lower side



Part Number	Bolt	
	A	B
SCY8・10	M4	M 5
SCZN／SCZA12・16	M6	M 8
SCZN／SCZA20～30	M8	M10

N・cm {kgf・cm}

Screw diameter	Recommended tightening torque
M 4	392 { 40}
M 5	794 { 81}
M 6	1353 {138}
M 8	3275 {334}
M10	6501 {663}

Notes : Be sure to take measures to prevent the angular pin holder from falling off from the mold.

●If the angular pin is not fixed to the angular pin holder, with a structure in which takes measures to prevent the angular pin holder from falling off (such as guide unit stopper), the angular pin holder could fall off when the mold tilts/turns over. Prior to mounting, be sure to take measures to prevent the angular pin holder from falling off from the mold.

Notes : Prior to mounting, be sure to apply running-in grease to the sliding surface.

OIL-FREE SLIDE UNITS FOR LOOSE CORE

—STANDARD・FIXING TYPE—

Non JIS material definition is listed on P.1351 - 1352

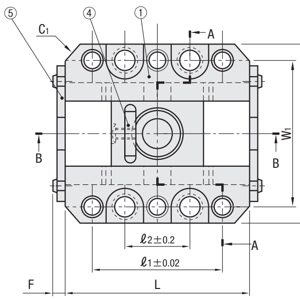
■Features of Oil-free Slide Units for Loose Core

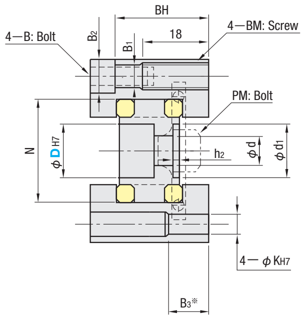
- Enables the inclined pin to slide smoothly when pushing out a loose core (including undercut) at an angle.
- The inclined pin holder slides within the range of θ , and the automatic center adjustment function reduces wear and scoring on the guide and slide plates.

Item	Components	Parts Name	M	Piece
①	**Slide base**	Slide Base	S55C	2
②	**Inclined pin holder**	Inclined Pin Holder	SCM440	1
③	**Slide plate**	Slide Plate	* CAC304＋Solid lubricant	2
④	**Parallel Key**	Key	S45C	1
⑤	**Stopper**	Stopper	SS400	2

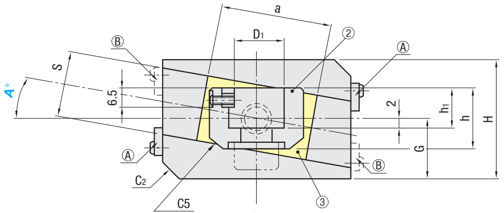
* High strength brass casting class 4 (Old JIS: HBsC4)

SCZN





A—A Section



B—B Section

Ⓐ and Ⓑ show the mounting position of the stopper. Refer to the angle of A°

You can specify the mounting angle of the slide plate in 1° -steps between 1° and 10° to match the angle of the undercut of the molded part.

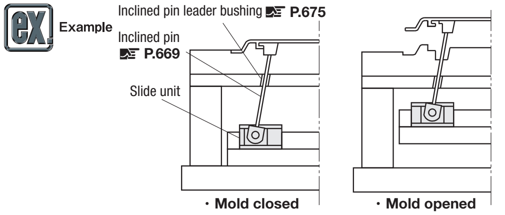
① Slide base					② Inclined pin holder							③ Slide plate		G	F	Part Number		Mounting angle of slide plate A° 1° Increments	U/Price A°	
W	L	H	C1	C2	D1	d	d1	h	h1	h2	N	S	a			Type	D		0	1～10
56	55	35	5	—	11	5.5	—	16	10	—	30	20	35	17.5	4.65	SCZN	12	0～10 2～4・6～10 are manufactured products, so they are shipped on the 12th days.	Quotation	
60	65	36	6	—	15	9	16	18	11	3	33	20	40	18	4.65		16			
68	70	43	6	5	18	11	20	22	13	5.5	38	24	40	21.5	4.65		20			
75	80	45	6	5	22	11	20	26	15	5.5	45	26	45	22.5	4.65		25			
81	95	54	6	5	27.5	11	20	30	17	3.5	51	30	55	27	4.65		30			

Part Number		Bolt hole dimensions									Mounting position of stopper	
Type	D	ℓ1	ℓ2	W1	B1	B2	B3	BM	BH	K	Ⓐ	Ⓑ
SCZN	12	42	21	45	6.6	11	15	M 8	28.5	6	0° ～10°	—
	16	46	25	48	6.6	11		M 8	29.5	6	0° ～10°	—
	20	50	25	55	8.6	13.5	20	M10	34.5	8	4° ～10°	0° ～3°
	25	60	35	62	8.6	13.5		M10	36.5	8	4° ～10°	0° ～3°
	30	75	50	68	8.6	13.5		M10	45.5	8	0° ～10°	—

☎ Order

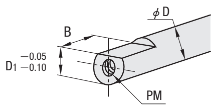
Part Number	—	A°
SCZN20	—	0

Days to Ship: Quotation



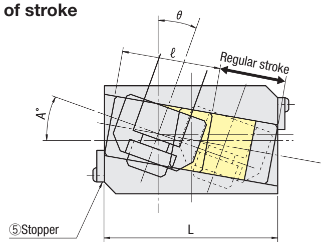
・Mold closed ・Mold opened

■Applicable inclined pin: Example of mounting dimension

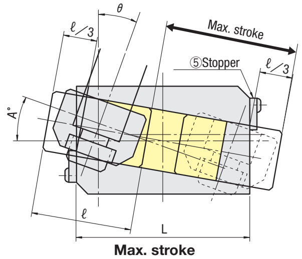


D	D1	B	PM
12	11	13	M 5
16	15	14	M 8
20	18	16	M10
25	22	18	M10
30	27.5	20	M10

■List of stroke



Regular stroke



Max. stroke

Unit: mm

Part Number	Regular stroke (Distance through which the slide plate moves to the end face of the slide base.)										
	A=0	A=1	A=2	A=3	A=4	A=5	A=6	A=7	A=8	A=9	A=10
SCZN12	20.0	19.6	19.3	19.0	18.7	18.4	18.2	17.9	17.7	17.5	17.3
SCZN16	25.0	24.6	24.3	24.0	23.7	23.4	23.2	23.0	22.8	22.6	22.4
SCZN20	30.0	29.5	29.2	28.8	28.4	28.1	27.8	27.5	27.3	27.0	26.8
SCZN25	35.0	34.5	34.1	33.7	33.3	33.0	32.7	32.4	32.1	31.8	31.6
SCZN30	40.0	39.4	39.0	38.5	38.1	37.7	37.3	37.0	36.7	36.4	36.1

Range of angle θ : 0° ≦ θ ≦20°

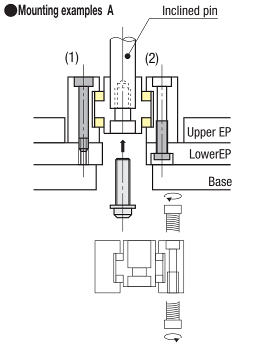
Unit: mm

Part Number	Max. stroke when taking the stopper ⑤ off (Standard stroke $+ 2\ell/3$; Note that this is the maximum value at which interference does not occur between the slide plate and the mounting face.)										
	A=0	A=1	A=2	A=3	A=4	A=5	A=6	A=7	A=8	A=9	A=10
SCZN12	43.3	42.9	42.6	42.3	42.0	41.7	41.5	41.2	41.0	40.8	40.6
SCZN16	51.6	51.3	51.0	50.7	50.4	50.1	49.9	49.6	49.4	49.3	49.1
SCZN20	56.6	56.2	55.8	55.5	55.1	54.8	54.5	54.2	53.9	53.7	53.5
SCZN25	65.0	64.5	64.1	63.7	63.3	63.0	62.7	62.4	62.1	61.8	61.6
SCZN30	76.6	76.1	75.6	75.2	74.8	74.4	74.0	73.6	73.3	73.0	72.8

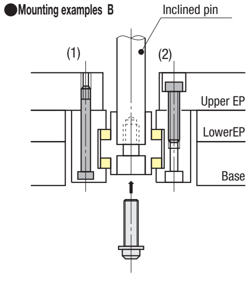
Range of angle θ : 0° ≦ θ ≦20°

■ Mounting examples

●Mounting examples A



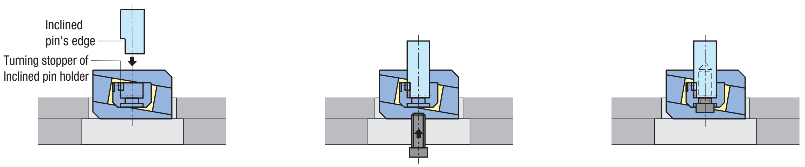
●Mounting examples B



(Use the unit with its slide base up side down.)

- ●Refer to the above table for dimensions of the inclined pin's edge cutout and screw size (PM).
  The counterbore in the inclined pin holder is made in a size that accommodates a socket head cap screw with a spring washer.
- ●The unit can be mounted on an ejector plate in two ways:(1) Screwing into the ejector plate, or (2) Screwing into the unit. For (2) use a socket head cap screw that corresponds to BM in the "Bolt Hole Dimensions" table. For (1) select a rank below the corresponding BM (i.e., M6 screw when BM is M8).
- ●Prior to mounting, apply * grease to the unit in order to protect it from wear during initial running-in.
- ●If the stroke is long, it is recommended that you use a bushing that supports the inclined pin. P.675

■ How to mount the inclined pin



1.Position the inclined pin's edge cutout on the turning stopper of the inclined pin holder and insert it.

2.Make sure to fix the inclined pin by tightening it up using the socket head cap screws or socket low head cap screws.

OIL-FREE SLIDE UNITS FOR LOOSE CORE

—STANDARD・ADJUSTING TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

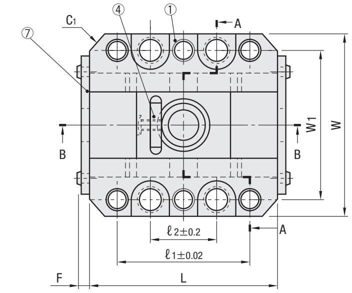
■Features of Oil-free Slide Units for Loose Core

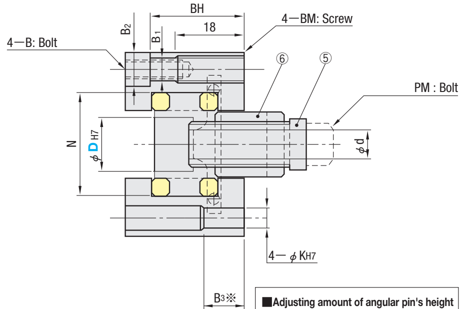
- Enables the inclined pin to slide smoothly when pushing out a loose core (including undercut) at an angle.
- The inclined pin holder slides within the range of θ, and the automatic center adjustment function reduces wear and scoring on the guide and slide plates.

Item	Components	Parts Name	M	Piece
①	**Slide base**	Slide Base	S55C	2
②	**Inclined pin holder**	Inclined Pin Holder	SCM440	1
③	**Slide plate**	Slide Plate	* CAC304＋Solid lubricant	2
④	**Key**	Key	S45C	1
⑤	**Adjust rod**	Adjust Rod	S45C	1
⑥	**Lock nut**	Lock Nut	S45C	1
⑦	**Stopper**	Stopper	SS400	2

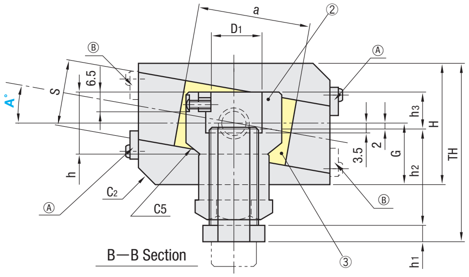
* Grade-4 high strength brass (Old JIS: HBsC4)

SCZA



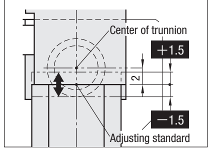


A—A Section

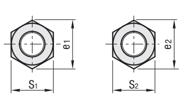


B—B Section

■Adjusting amount of angular pin's height



■Lock nut ■Adjust rod



Ⓐ and Ⓑ show the mounting position of the stopper. Refer to the angle of A°

You can specify the mounting angle of the slide plate in 1° -steps between 1° and 10° to match the angle of the undercut of the molded part.

① Slide base					② Angular pin holder							③ Slide plate		TH	G	F	Part Number		Mounting angle of slide plate A° 1° Increments	U/Price A°	
W	L	H	C1	C2	D1	d	h	h1	h2	h3	N	S	a				Type	D		0	1~10
56	55	35	5	—	11	5.5	16	6	33	10	30	20	35	58.5	17.5	4.65	SCZA	12	0~10	Quotation	
60	65	36	6	—	15	9	18	6	33	11	33	20	40	59	18	4.65		16	2~4・6~10 are manufactured products, so they are shipped on the 12th days.		
68	70	43	6	5	18	11	22	6	36	13	38	24	40	65.5	21.5	4.65		20			
75	80	45	6	5	22	11	26	6	39	15	45	26	45	69.5	22.5	4.65		25			
81	95	54	6	5	27.5	11	30	6	41	17	51	30	55	76	27	4.65		30			

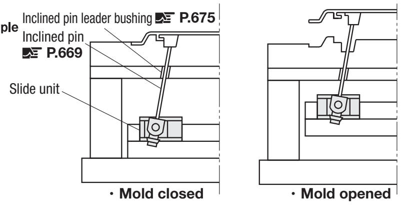
Part Number		Bolt hole dimensions									⑥ Lock nut		⑤ Adjust rod		Mounting position of stopper	
Type	D	ℓ1	ℓ2	W1	B1	B2	B3	BM	BH	K	S1	e1	S2	e2	Ⓐ	Ⓑ
SCZA	12	42	21	45	6.6	11	15	M 8	28.5	6	17	19.6	12	13.9	0° ~10°	—
	16	46	25	48	6.6	11		M 8	29.5	6	21	24.2	16	18.5	0° ~10°	—
	20	50	25	55	8.6	13.5	20	M10	34.5	8	24	27.7	19	21.9	4° ~10°	0° ~3°
	25	60	35	62	8.6	13.5		M10	36.5	8	24	27.7	19	21.9	4° ~10°	0° ~3°
	30	75	50	68	8.6	13.5		M10	45.5	8	24	27.7	19	21.9	0° ~10°	—

Order

Part Number	—	A°
SCZA20	—	5

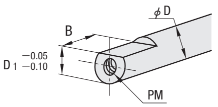
Days to Ship Quotation

Example



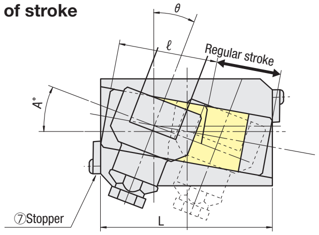
・Mold closed ・Mold opened

■Applicable inclined pin : Example of mounting dimension



D	D1	B	PM
12	11	13	M 5
16	15	14	M 8
20	18	16	M10
25	22	18	M10
30	27.5	20	M10

■List of stroke

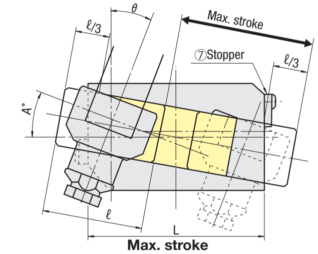


Regular stroke

Unit: mm

Part Number	Regular stroke (Distance through which the slide plate moves to the end face of the slide base.)										
	A=0	A=1	A=2	A=3	A=4	A=5	A=6	A=7	A=8	A=9	A=10
SCZA12	20.0	19.6	19.3	19.0	18.7	18.4	18.2	17.9	17.7	17.5	17.3
SCZA16	25.0	24.6	24.3	24.0	23.7	23.4	23.2	23.0	22.8	22.6	22.4
SCZA20	30.0	29.5	29.2	28.8	28.4	28.1	27.8	27.5	27.3	27.0	26.8
SCZA25	35.0	34.5	34.1	33.7	33.3	33.0	32.7	32.4	32.1	31.8	31.6
SCZA30	40.0	39.4	39.0	38.5	38.1	37.7	37.3	37.0	36.7	36.4	36.1

Range of angle θ : $0° \leqq \theta \leqq 20°$



Max. stroke

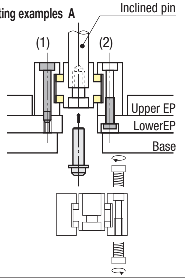
Unit: mm

Part Number	Max. stroke when taking the stopper ⑦ off (Standard stroke + $2\ell/3$; Note that this is the maximum value at which interference does not occur between the slide plate and the mounting face.)										
	A=0	A=1	A=2	A=3	A=4	A=5	A=6	A=7	A=8	A=9	A=10
SCZA12	43.3	42.9	42.6	42.3	42.0	41.7	41.5	41.2	41.0	40.8	40.6
SCZA16	51.6	51.3	51.0	50.7	50.4	50.1	49.9	49.6	49.4	49.3	49.1
SCZA20	56.6	56.2	55.8	55.5	55.1	54.8	54.5	54.2	53.9	53.7	53.5
SCZA25	65.0	64.5	64.1	63.7	63.3	63.0	62.7	62.4	62.1	61.8	61.6
SCZA30	76.6	76.1	75.6	75.2	74.8	74.4	74.0	73.6	73.3	73.0	72.8

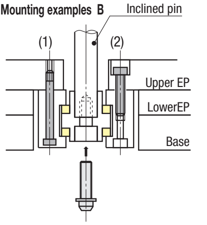
Range of angle θ : $0° \leqq \theta \leqq 20°$

■ Mounting examples

●Mounting examples A



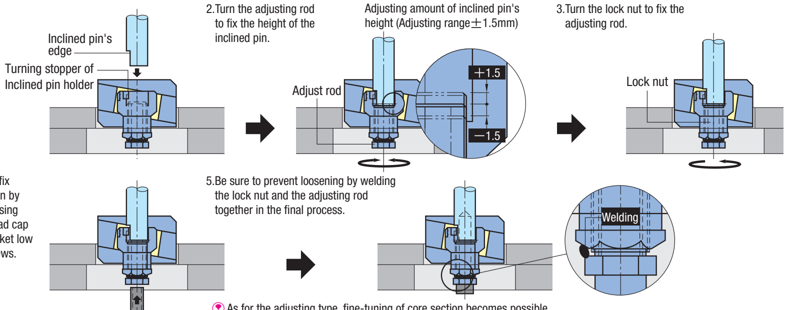
●Mounting examples B



(Use the unit with its slide base up side down.)

- ●Refer to the above table for dimensions of the inclined pin's edge cutout and screw size (PM).
  The counterbore on the inclined pin holder is made in a size that accommodates for a socket head cap screw with a spring washer.
- ●The unit can be mounted on an ejector plate in two ways :(1)Screwing into the ejector plate, or (2)Screwing into the unit. For (2) use a socket head cap screw that corresponds to BM in the Bolt hole dimensions table. For (1) select a rank below the corresponding BM (i.e., M6 screw when BM is M8).
- ●Prior to mounting, apply * grease to the unit in order to protect it from wear during initial running-in.
- ●If the stroke is long, it is recommended that you use a bushing that supports the inclined pin. P.675

■ How to mount the inclined pin



1.Position the inclined pin's edge cutout on the turning stopper of the inclined pin holder and insert it.

2.Turn the adjusting rod to fix the height of the inclined pin.

Adjusting amount of inclined pin's height (Adjusting range±1.5mm)

3.Turn the lock nut to fix the adjusting rod.

4.Make sure to fix the inclined pin by tightening it using the socket head cap screws or socket low head cap screws.

5.Be sure to prevent loosening by welding the lock nut and the adjusting rod together in the final process.

As for the adjusting type, fine-tuning of core section becomes possible by using adjust nut.

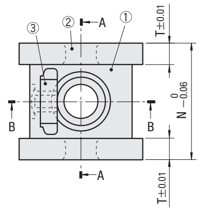
OIL-FREE SLIDE INCLINED PIN HOLDERS FOR LOOSE CORE

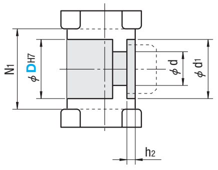
—FIXED TYPE／ADJUSTING TYPE—

Non JIS material definition is listed on P.1351 - 1352

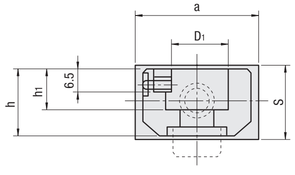
RoHS

SCZNP (Fixed type)





A—A Section



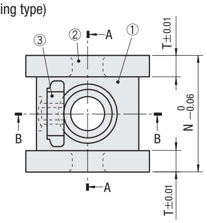
B—B Section

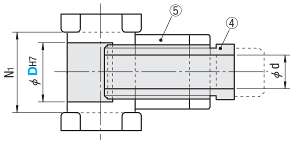
Item	Components	Parts Name	M	Piece
①	**Inclined pin holder**	Inclined Pin Holder	SCM440	1
②	**Slide plate**	Slide Plate	* CAC304＋Solid lubricant	2
③	**Key**	Key	S45C	1

* Grade-4 high strength brass (Old JIS: HBsC4)

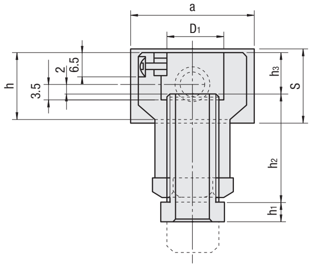
RoHS

SCZAP (Adjusting type)



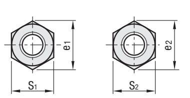


A—A Section

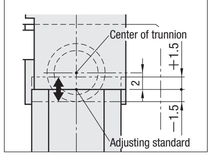


B—B Section

■Lock nut ■Adjust rod



■Adjusting amount of angular pin's height



Item	Components	Parts Name	M	Piece
①	**Inclined pin holder**	Inclined Pin Holder	SCM440	1
②	**Slide plate**	Slide Plate	* CAC304＋Solid lubricant	2
③	**Key**	Key	S45C	1
④	**Adjust rod**	Adjust Rod	S45C	1
⑤	**Lock nut**	Lock Nut	S45C	1

* Grade-4 high strength brass (Old JIS: HBsC4)

■Fixed type

Part Number		① Inclined pin holder Common with SCZN ② Inclined pin holder								② Slide plate Common with SCZN ③ Slide plate			U/Price
Type	D	D1	d	d1	h	h1	h2	N	N1	S	a	T	
SCZNP	12	11	5.5	—	16	10	—	30	17	20	35	6.5	Quotation
	16	15	9	16	18	11	3	33	20	20	40	6.5	
	20	18	11	20	22	13	5.5	38	25	24	40	6.5	
	25	22	11	20	26	15	5.5	45	31	26	45	7	
	30	27.5	11	20	30	17	3.5	51	36	30	55	7.5	

SCZNP is on sale by set of both components of SCZN i.e. ② inclined pin holder and ③ slide plate.

■Adjusting Type

Part Number		① Inclined pin holder Common with SCZA ② Inclined pin holder								② Slide plate Common with SCZA ③ Slide plate			⑤ Lock nut Common with SCZA ⑥ Lock nut		④ Adjust rod Common with SCZA ⑤ Adjust rod		U/Price
Type	D	D1	d	h	h1	h2	h3	N	N1	S	a	T	S1	e1	S2	e2	
SCZAP	12	11	5.5	16	6	33	10	30	17	20	35	6.5	17	19.6	12	13.9	Quotation
	16	15	9	18	6	33	11	33	20	20	40	6.5	21	24.2	16	18.5	
	20	18	11	22	6	36	13	38	25	24	40	6.5	24	27.7	19	21.9	
	25	22	11	26	6	39	15	45	31	26	45	7	24	27.7	19	21.9	
	30	27.5	11	30	6	41	17	51	36	30	55	7.5	24	27.7	19	21.9	

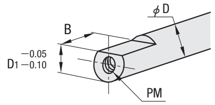
SCZAP is on sale by set of the four components of SCZA i.e. ② angular pin holder, ③ slide plate, ⑤ adjust rod and ⑥ lock nut.

Order	Part Number	Days to Ship
	SCZNP 12 SCZAP 20	Quotation

■Characteristics

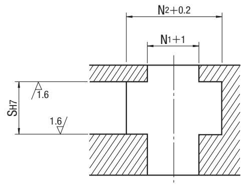
- Guide parts of SCZN and SCZA series.
  Please refer to SCZN and SCZA series **P.659 · 661** when the slide base is necessary.
- Space is reduced to process the slide base on mold's body.
- The neck sliding structure of inclined pin holder enables the automatic center adjustment function, which reduces abrasion and scoring on the guide and slide plates.

■Applicable inclined pin : Example of mounting dimension

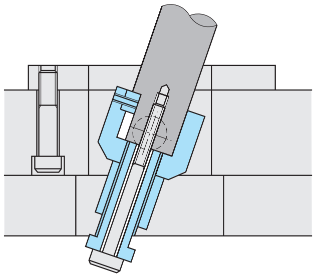


D	D1	B	PM
12	11	13	M5
16	15	14	M8
20	18	16	M10
25	22	18	M10
30	27.5	20	M10

■Other groove dimension (Reference value)



Example



OIL-FREE SLIDE UNITS FOR LOOSE CORE

Non JIS material definition is listed on P.1351 - 1352

RoHS

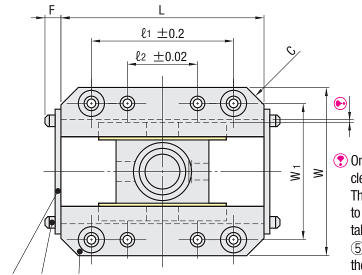
■Features of Oil-free Slide Units for Loose Core

- Enables the inclined pin to slide smoothly when pushing out a loose core (including undercut) at an angle.
- The inclined pin guide slides within the range of θ, and the automatic center adjustment function reduces wear and scoring on the guide and slide plates.

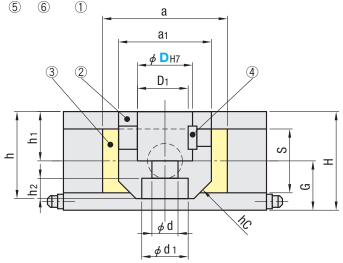
Item	Components	Parts Name	M	Piece
①	**Slide base**	Slide Base	S55C	2
②	**Inclined pin holder**	Inclined Pin Holder	SCM440	1
③	**Slide plate**	Slide Plate	* CAC304+Solid lubricant	2
④	**Spring Pins & Dowel Pins**	Set Pin	S45C	1
⑤	**Stopper**	Stopper	SS400	2
⑥	**Stopper fixing screw**	Set Screw for Stopper	SCM435	4

* High strength brass casting class 4 (Old JIS: HBsC4)

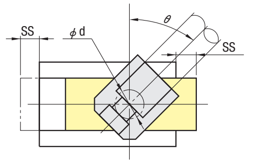
SCY


F
L
ℓ1 ±0.2
ℓ2 ±0.02
C
W1
W
⑤
⑥
①

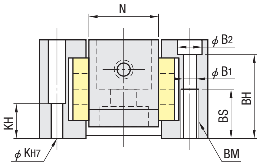
One side has a clearance of 0.5mm. Thus when you hope to precisely adjust, take the stopper ⑤ off and reduce the clearance in the current state. Alternatively, use a standard type that has a clearance of 0.1mm.


a
a1
ϕ DH7
D1
③
②
④
h
h1
h2
S
G
H
ϕ d
ϕ d1
hC

- The stroke length can be maximized by removing the stopper ⑤



Part Number	Regular stroke	SS	Max. stroke (SSmax) with the stopper removed	Range of inclination angle θ
SCY8	18	7.0	13.5	0°≦θ≦20° ※ θ can be set up to 30°, however we recommend the range above.
SCY10	18	9.0	17.0	


N
ϕ B2
ϕ B1
BS
BH
KH
ϕ KH7
BM

① Slide base				② Inclined pin holder									③ Slide plate		G	F	Part Number		U/Price
W	L	H	C	D1	d	d1	h	h1	h2	a1	hC	N	S	a			Type	D	
44	44	24	3	7.5	4.5	10	20	12	5	16	2.5	12	14	26	12	5	SCY	8	Quotation
50	50	28	3	8.5	5.5	11	24	14	6	20	3	14	16	32	14	5		10	

Part Number		Bolt hole dimensions									
Type	D	ℓ1	ℓ2	W1	B1	B2	BM	BH	BS	K	KH
SCY	8	30	12	35	4.3	8	M5	19.0	14	4	10
	10	36	16	38	4.3	8	M5	23.0	14	4	10

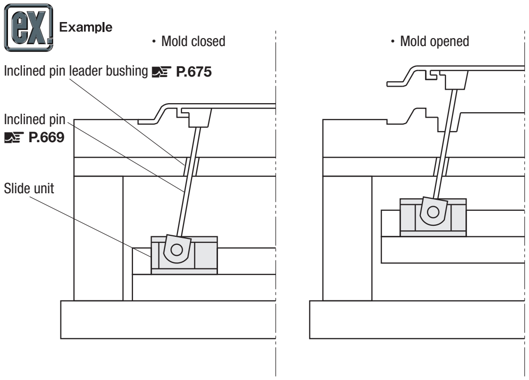
Order

Part Number
SCY8

Days to Ship

Quotation

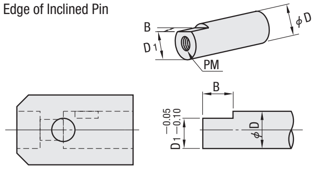
Example


ex
Example
・Mold closed
・Mold opened
Inclined pin leader bushing P.675
Inclined pin
P.669
Slide unit

■Inclined pin dimensions

Inclined pin edge cutout

Edge of Inclined Pin

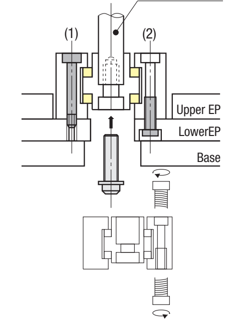

B
D1
PM
ϕD
B
D1 −0.05 −0.10
ϕD

●Inclined pin dimensions

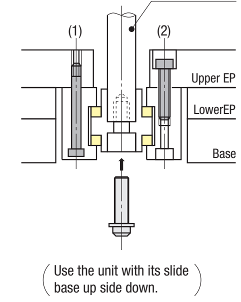
D	D1	B	PM
8	7.5	10	M 4
10	8.5		M 5

■Mounting examples

●Mounting examples A


Inclined pin
(1)
(2)
Upper EP
LowerEP
Base

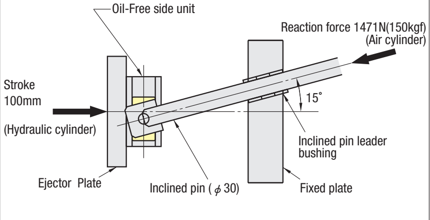
●Mounting examples B


Inclined pin
(1)
(2)
Upper EP
LowerEP
Base

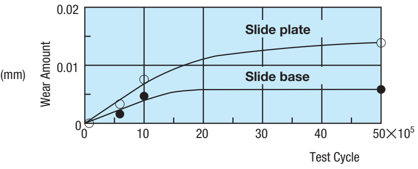
Use the unit with its slide base up side down.

- ●Refer to the above table for dimensions of the inclined pin's edge cutout and screw size (PM). The counterbore on the inclined pin holder is made in a size that accommodates for a socket head cap screw with a spring washer.
- ●The unit can be mounted on an ejector plate in two ways:(1) Screwing into the ejector plate, or (2) Screwing into the unit. For (2) use a socket head cap screw that corresponds to BM in the Bolt hole dimensions table. For (1) select a rank below the corresponding BM (i.e., M6 screw when BM is M8).
- ●Prior to mounting, apply * grease to the unit in order to protect it from wear during initial running-in.
- ●If the stroke is long, it is recommended that you use a bushing that supports the inclined pin. P.675

■Durability test data


Oil-Free side unit
Reaction force 1471N(150kgf) (Air cylinder)
Stroke 100mm
(Hydraulic cylinder)
15°
Inclined pin leader bushing
Ejector Plate
Inclined pin (ϕ30)
Fixed plate

Sketch of Test Machine



Durability Test Result

●Testing method and conditions

Tested Product : Oil-free Slide Guide Units for Loose Core Old Standard SCY30

Inclination angle : 15°

Reaction: 1471N{150kgf} (applied at the ejector plate start up and kept until the stroke reaches 10mm)

Stroke: Ejector plate stroke 100mm (Slide plate stroke 26.8mm)

Testing speed: 0.42S^{-1}{25cpm} (Slide plate's sliding speed 0.04m/s {2.5m/min})

●Results of durability test

- Repeated 500,000 times, the test results indicate excellent abrasion resistance with an average wear amount of 0.005mm on the slide base, 0.013mm on the slide plate.
- This is considered to be attributable to the slide unit's automatic center adjustment function that helped prevent uneven sliding, and the oil-free bearing's excellent scoring resistance.

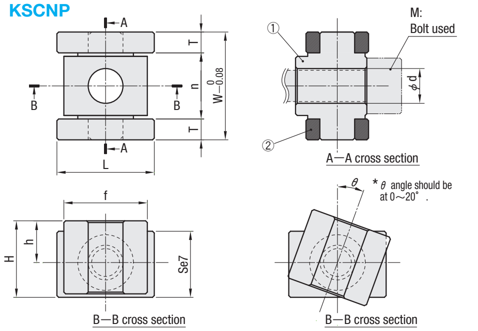
OIL-FREE SLIDE INCLINED PIN HOLDERS FOR LOOSE CORE

—SELECTION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

KSCNP


A
A
B
B
T
n
W 0 −0.08
T
L
①
②
M:
Bolt used
ϕd
A—A cross section
f
H
h
Se7
B—B cross section
θ
* θ angle should be at 0～20°.
B—B cross section

No.	Components	M	Piece
①	**Inclined pin holder**	SCM440	1
②	**Slide plate**	Sintered alloy+Steel	2

Bolts are not attached.

W	T±0.01	L	Se7		H	h	ϕd	n	f	M	Part Number		U/Price
											Type	No.(M)	1～5
14	3	12	8	−0.025 −0.040	10	6	4.5	8	12	M4	KSCNP	4	Quotation
16		15	10		12	7	5.5	10	14	M5		5	
20	4	18	12	−0.032 −0.050	14	8	6.5	12	16	M6		6	
28	6.5	35	20	−0.040 −0.061	20	12	8.5	15	19	M8		8	
31		40			21		10.5	18	22	M10		10	

To be quoted on price・lead time above Max. Q'ty.

Order

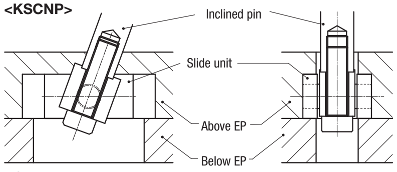
Part Number
KSCNP4

Days to Ship **Quotation**

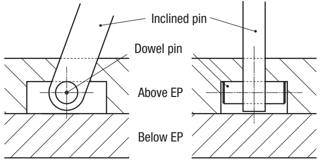
■Characteristics

- Space is reduced to process the slide base on mold's body.
- The equipment is structured to tighten the inclined pins from beneath with bolts, so installation, removal and length adjustment of inclined pins are easy.
- Cannot be used for any structure that directly receives injection pressure.

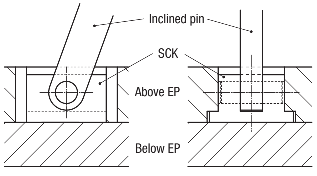
<KSCNP>


Inclined pin
Slide unit
Above EP
Below EP

<Conventional structure>

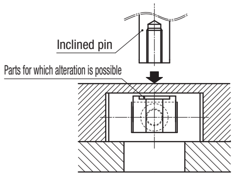

Inclined pin
Dowel pin
Above EP
Below EP

<Loose core fixed with dowel>

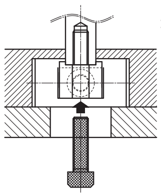

Inclined pin
SCK
Above EP
Below EP

<SCK used>

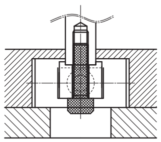
■How to Mount


Inclined pin
Parts for which alteration is possible

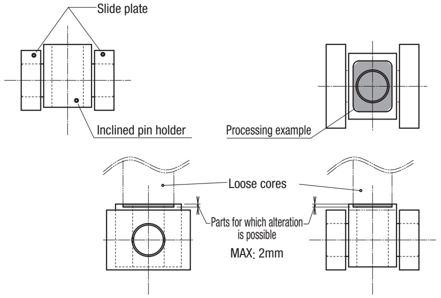
1. If adjustment of inclined pin shape or in vertical direction is required, alteration of inclined pin holder and setting on the inclined pin holder are possible.



2. Make sure to fix the inclined pin by tightening it up using the socket head cap screws or socket low head cap screws.

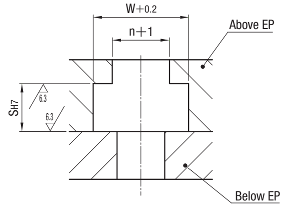


■Alteration Example


Slide plate
Inclined pin holder
Processing example
Loose cores
Parts for which alteration is possible
MAX: 2mm

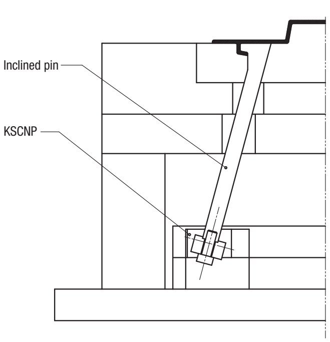
Alteration is possible on some part of inclined pin holder, so alteration for positioning and height adjustment is possible.
※For alteration, the slide plate can be removed.

■Mounting process dimensions (reference values)

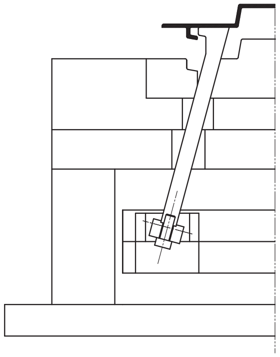

W+0.2
n+1
Above EP
SH7
6.3
6.3
Below EP

KSCNP

■Example


Inclined pin
KSCNP

Mold closed

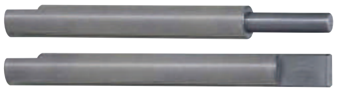


Mold opened

INCLINED PINS・DIRECT PUSH-UP PINS①

—STEPPED／KEY FLATS TYPE—

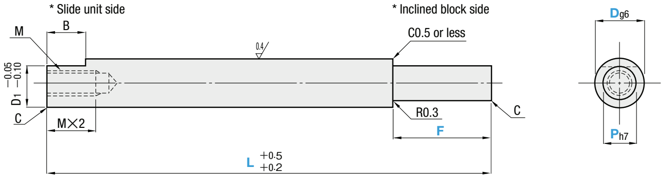
(!) Non JIS material definition is listed on P.1351 - 1352



RoHS

Stepped type

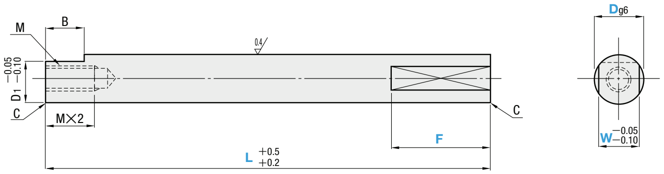
K−KSPSA (Applicable to standard SCZN・SCZA)
KSPSA (For SCY)



M SUJ2 **H** 58HRC～ **S** Induction hardening (depth: 0.5mm or more)

Key flats type

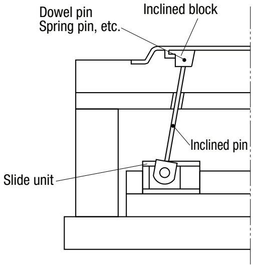
K−KSPSB (Applicable to standard SCZN・SCZA)
KSPSB (For SCY)



M SUJ2 **H** 58HRC～ **S** Induction hardening (depth: 0.5mm or more)

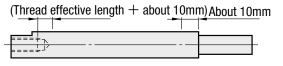
Example

- When connecting the inclined pin and inclined block, use a dowel pin, etc. to fix them after preparing a common hole.
- The inclined pin's full length (L) is set in the positive range of tolerance in order to accommodate for fine adjustment.



＜About shaft end processing＞

- Induction hardening is not applied since machining of shaft ends and key flats are performed after annealing.



* The area (D dimension wise) within 10mm or so from the machined section may have a lower hardness due to annealing.

■Dimension contrast table

Corresponding oil-free slide units	Standard type (SCZN・SCZA)					SCY			
Part Number	K−KSPSA K−KSPSB		K−KSPSC(P.671) K−KSPSD(P.671)	K−KSPSE(P.673)		KSPSA KSPSB		KSPSC(P.671)	KSPSE(P.673)
D	M	B	M	M	B	M	B	M	M
8	—	—	—	—	—	M 4	10	M 4	M4
10	—	—	—	—	—	M 5	10	M 5	M5
12	M 5	13	M 5	M 5	13	M 6	10	M 6	—
16	M 8	14	M 6	M 8	14	M 8	13	M 8	—
20	M10	16	M 8	M10	16	M10	16	M10	—
25		18	M10		18	M12	19	M12	—
30		20	M10		20	M12	19	M12	—

- Note that K—KSPSA and K—KSPSB cannot be replaced by KSPSA and KSPSB.
- Note that inclined pins of D8 and D10 corresponding to the standard are not on sale.
- Use KSPSA/KSPSB12～30 for maintenance.

■K−KSPSA Stepped type (Applications : slide units standard SCZN P.659・SCZA P.661)

D_1	B	M	C	D_{g6}		Part Number		1mm increments			U/Price 1～9					
						Type	D	L	F	P	L100～200	201～300	301～400	401～500	501～600	601～800
11	13	M5	0.5	12	−0.006	K−KSPSA	12	100～800	P≦F≦P×4 (L−B−F≧10)	6～ 9	Quotation					
15	14	M8		16	−0.017		16			8～13						
18	16	M10	1.0	20	−0.007 −0.020		20			10～17						
22	18			25			25			12～22						
27.5	20			30			30			15～27						

■KSPSA Stepped type (Applications : slide units for SCY P.665)

D_1	B	M	C	D_{g6}		Part Number		1mm increments			U/Price 1～9					
						Type	D	L	F	P	L100～200	201～300	301～400	401～500	501～600	601～800
7.5	10	M4	0.3	8	−0.005	KSPSA	8	100～600	P≦F≦P×4 (L−B−F≧10)	4～ 6	Quotation					
8.5	10	M5		10	−0.014		10	100～800		5～ 8						
10	10	M6	0.5	12	−0.006		12			6～ 9						
13	13	M8		16	−0.017		16			8～13						
17	16	M10	1.0	20	−0.007 −0.020		20			10～17						
22	19	M12		25			25			12～22						
27	19	M12		30			30			15～27						

■K−KSPSB Key flats type (Applications : slide units standard SCZN P.659・SCZA P.661)

D_1	B	M	C	D_{g6}		Part Number		1mm increments			U/Price 1～9					
						Type	D	L	F	W	L100～200	201～300	301～400	401～500	501～600	601～800
11	13	M5	0.5	12	−0.006	K−KSPSB	12	100～800	10～50 (L−B−F≧10)	3～10	Quotation					
15	14	M8		16	−0.017		16			6～14						
18	16	M10	1.0	20	−0.007 −0.020		20			10～18						
22	18			25			25			15～23						
27.5	20			30			30			20～28						

■KSPSB Key flats type (Applications : slide units for SCY P.665)

D_1	B	M	C	D_{g6}		Part Number		1mm increments			U/Price 1～9					
						Type	D	L	F	W	L100～200	201～300	301～400	401～500	501～600	601～800
7.5	10	M4	0.3	8	−0.005	KSPSB	8	100～600	10～50 (L−B−F≧10)	3～ 7	Quotation					
8.5	10	M5		10	−0.014		10	100～800		3～ 8						
10	10	M6	0.5	12	−0.006		12			3～10						
13	13	M8		16	−0.017		16			6～14						
17	16	M10	1.0	20	−0.007 −0.020		20			10～18						
22	19	M12		25			25			15～23						
27	19	M12		30			30			20～28						

Order

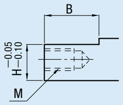
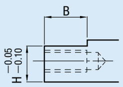
	Part Number		L		F		P		W
SCZN・SCZA Applications	K−KSPSA12	—	500	—	F25	—	P8		
For SCY	KSPSA8	—	300	—	F20	—	P5		
SCZN・SCZA Applications	K−KSPSB12	—	300	—	F20			—	W4
For SCY	KSPSB8	—	300	—	F20			—	W7

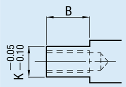
Days to Ship Quotation

Price Quotation

Alterations

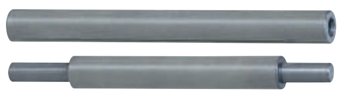
Part Number		L		F		P		W		(SC・SCW···etc.)
KSPSA20	—	300	—	F30	—	P17			—	SC — B16 — H18

<table>
<tr><th>Alteration</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td>
B
H −0.05 −0.10
M</td><td>SCM</td><td>Inclined pin holder alteration available for small loose core unit by changing dimensions of tap hole and edge cutting.
(!) Available for D dimensions of KSPSA at 8, 10, 12.
⊗ Combination with SC and SCW not available.
Designation method SCM
<table><tr><th>D</th><th>M</th><th>B</th><th>H</th></tr><tr><td>8</td><td>M5</td><td>15</td><td>7.5</td></tr><tr><td>10</td><td>M6</td><td>17</td><td>9.5</td></tr><tr><td>12</td><td>M8</td><td></td><td>11</td></tr></table></td><td>Quotation</td></tr>
<tr><td>
B
H −0.05 −0.10</td><td>SC</td><td>Flat edge cutting (1 plane)
Chamfering dimension can be changed.
B=1mm increments, H=1mm increments
⊗ Not available for D8・10
(!) 10≦B≦50 L−B−F≧10
Designation method SC−B16−H17
<table><tr><th>D</th><th>H</th><th>D</th><th>H</th></tr><tr><td>12</td><td>10≦H≦11</td><td>20</td><td>17≦H≦19</td></tr><tr><td>16</td><td>13≦H≦15</td><td>25</td><td>22≦H≦24</td></tr><tr><td></td><td></td><td>30</td><td>25≦H≦29</td></tr></table>(!) Note that the alteration (SC) is not applicable to slide unit.</td><td></td></tr>
</table>

<table>
<tr><th>Alteration</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td>
B
K −0.05 −0.10</td><td>SCW</td><td>Flat edge cutting (2 planes)
B=1mm increments, K=1mm increments
⊗ Not available for D8・10
(!) 10≦B≦50 L−B−F≧10
Designation method SCW−B16−K17
<table><tr><th>D</th><th>K</th><th>D</th><th>K</th></tr><tr><td>12</td><td>8≦K≦10</td><td>20</td><td>14≦K≦18</td></tr><tr><td>16</td><td>10≦K≦14</td><td>25</td><td>19≦K≦24</td></tr><tr><td></td><td></td><td>30</td><td>20≦K≦29</td></tr></table>(!) Note that the alteration (SCW) is not applicable to slide unit.</td><td>Quotation</td></tr>
</table>

INCLINED PINS・DIRECT PUSH-UP PINS②

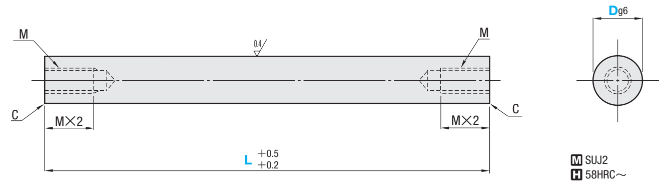
—BOTH ENDS TAPPED／BOTH ENDS STEPPED TYPE—



RoHS

Both ends tapped type

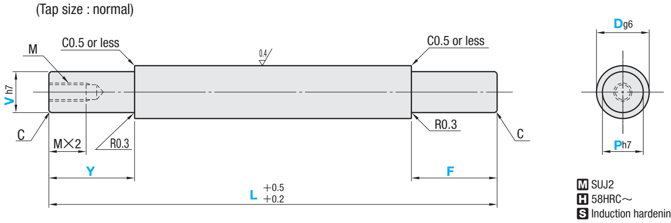
K—KSPSC (Tap size : compact)
KSPSC (Tap size : normal)



M SUJ2
H 58HRC～
S Induction hardening (depth : 0.5mm or more)

Both ends stepped type

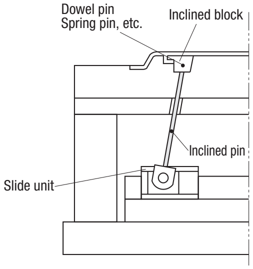
K—KSPSD (Tap size : compact)
(Tap size : normal)



M SUJ2
H 58HRC～
S Induction hardening (depth : 0.5mm or more)

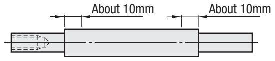
Example

- When connecting the inclined pin and inclined block, use a dowel pin, etc. to fix them after preparing a common hole.
- The inclined pin's full length (L) is set in the positive range of tolerance in order to accommodate for fine adjustment.



<About shaft end processing>

- Induction hardening is not applied since machining of shaft ends and key flats are performed after annealing.



* The area (D dimension wise) within 10mm or so from the machined section may have a lower hardness due to annealing.

- Overall induction hardening is applied to K—KSPSC and KSPSC (both ends tapped type).

■Dimension contrast table

Corresponding oil-free slide units	Standard type (SCZN・SCZA)					SCY			
Part Number	K—KSPSA(P.669) K—KSPSB(P.669)		K—KSPSC K—KSPSD	K—KSPSE(P.673)		KSPSA(P.669) KSPSB(P.669)		KSPSC	KSPSE(P.673)
D	M	B	M	M	B	M	B	M	M
8	—	—	—	—	—	M 4	10	M 4	M4
10	—	—	—	—	—	M 5	10	M 5	M5
12	M 5	13	M 5	M 5	13	M 6	10	M 6	—
16	M 8	14	M 6	M 8	14	M 8	13	M 8	—
20	M10	16	M 8	M10	16	M10	16	M10	—
25		18	M10		18	M12	19	M12	—
30		20	M10		20	M12	19	M12	—

- Note that inclined pins of D8 and D10 corresponding to the standard are not on sale.

Non JIS material definition is listed on P.1351 - 1352

■K—KSPSC Both ends tapped type (Tap size : compact)

M	C	Dg6		Part Number Type	D	L 1mm increments	U/Price 1～9 L100～200	201～300	301～400	401～500	501～600	601～800
M5	0.5	12	−0.006 −0.017	K—KSPSC	12	100～800	Quotation					
M6		16			16							
M8	1.0	20	−0.007 −0.020		20							
M10		25			25							
		30			30							

■KSPSC Both ends tapped type (Tap size : normal)

M	C	Dg6		Part Number Type	D	L 1mm increments	U/Price 1～9 L100～200	201～300	301～400	401～500	501～600	601～800
M4	0.3	8	−0.005 −0.014	KSPSC	8	100～600	Quotation					
M5		10			10	100～800						
M6	0.5	12	−0.006 −0.017		12							
M8		16			16							
M10	1.0	20	−0.007 −0.020		20							
M12		25			25							
M12		30			30							

■K—KSPSD Both ends stepped type (Tap size : compact)

M	C	Dg6		Part Number Type	D	1mm increments L	F	P	Y	V	U/Price 1～9 L100～200	201～300	301～400	401～500	501～600	601～800
M6	0.5	16	−0.006 −0.017	K—KSPSD	16	100 ～ 800	F≧P F≦P×4 (L−Y−F≧10)	8～13	Y≧V Y≦V×4	12～14	Quotation					
M8	1.0	20	−0.007 −0.020		20			10～17		15～18						
M10		25			25			12～22		18～22						
		30			30			15～27		20～27						

Order

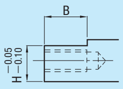
	Part Number		L		F		P		Y		V
Tap size : Compact	K—KSPSC12	—	150								
Normal	KSPSC20	—	300								
Compact	K—KSPSD20	—	250	—	F12	—	P10	—	Y16	—	V16

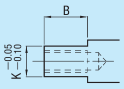
Days to Ship Quotation

Price Quotation

Alterations

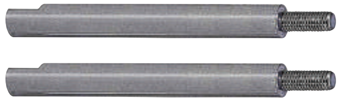
Part Number — L — F — P — Y — V — (SC・SCW)
KSPSC20 — 300 — SC — B16 — H18

Alteration	Code	Spec.	1Code
	SC	Flat edge chamfering (1 plane) Adds new chamfering applicable to K—KSPSC・KSPSC. B=1mm increments, H=1mm increments ⊗ Not available for D8・10 10≦B≦50 L—B—F≧10 Designation method SC—B16—H17 D 12: 10≦H≦11; D 16: 13≦H≦15; D 20: 17≦H≦19; D 25: 22≦H≦24; D 30: 25≦H≦29	Quotation

Alteration	Code	Spec.	1Code
	SCW	Flat edge chamfering (2 planes) Applicable to K—KSPSC・KSPSC B=1mm increments, K=1mm increments ⊗ Not available for D8・10 10≦B≦50 L—B—F≧10 Designation method SCW—B16—K17 D 12: 8≦K≦10; D 16: 10≦K≦14; D 20: 14≦K≦18; D 25: 19≦K≦24; D 30: 20≦K≦29	Quotation

INCLINED PINS・DIRECT PUSH-UP PINS③

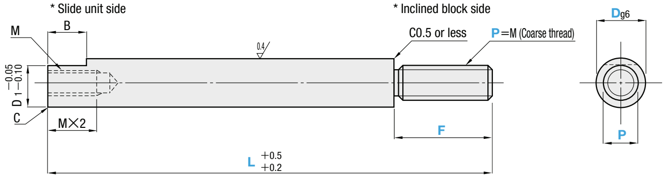
—ONE SIDE MALE THREAD・THE OTHER FEMALE THREAD TYPE—



RoHS

One side male thread・the other side female thread type

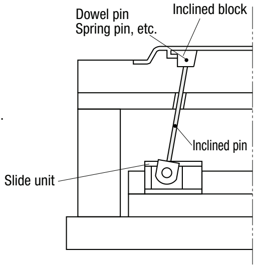
K−KSPSE (Applicable to standard SCZN・SCZA)
KSPSE (For SCY)



M SUJ2
H 58HRC～
S Induction hardening (depth : 0.5mm or more)

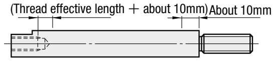
Example

- When connecting the inclined pin and inclined block, use a dowel pin,etc. to fix them after preparing a common hole.
- The inclined pin's full length (L) is set in the positive range of tolerance in order to accommodate for fine adjustment.



＜About shaft end processing＞

- Induction hardening is not applied since machining of shaft ends and key flats are performed after annealing.



* The area (D dimension wise) within 10mm or so from the machined section may have a lower hardness due to annealing.

■Dimension contrast table

Corresponding oil-free slide units	Standard type (SCZN・SCZA)					SCY			
Part Number	K−KSPSA(P.669) K−KSPSB(P.669)		K−KSPSC(P.671) K−KSPSD(P.671)	K−KSPSE		KSPSA(P.669) KSPSB(P.669)		KSPSC(P.671)	KSPSE
D	M	B	M	M	B	M	B	M	M
8	—	—	—	—	—	M 4	10	M 4	M4
10	—	—	—	—	—	M 5	10	M 5	M5
12	M 5	13	M 5	M 5	13	M 6	10	M 6	—
16	M 8	14	M 6	M 8	14	M 8	13	M 8	—
20	M10	16	M 8	M10	16	M10	16	M10	—
25		18	M10		18	M12	19	M12	—
30		20	M10		20	M12	19	M12	—

・Note that inclined pins of D8 and D10 corresponding to the standard are not on sale.

Non JIS material definition is listed on P.1351 - 1352

■**K−KSPSE** One side male thread・the other side female thread type (Applications : slide units standard SCZN P.659・SCZA P.661)

D1	B	M	Dg6		Part Number Type	Part Number D	1mm increments L	1mm increments F	Selection P	U/Price 1～9 L100～200	201～300	301～400	401～500	501～600	601～800
11	13	M 5	12	−0.006 −0.017	K−KSPSE	12	100～800	P≦F≦P×3 (L−B−F≧10)	6 8 10	Quotation					
15	14	M 8	16			16			8 10 12						
18	16	M10	20	−0.007 −0.020		20			10 12 16						
22	18		25			25			12 16 20						
27.5	20		30			30			16 20 24						

■**KSPSE** One side male thread・the other side female thread type (Applications : slide units for SCY P.665)

D1	B	M	Dg6		Part Number Type	Part Number D	1mm increments L	1mm increments F	Selection P	U/Price 1～9 L100～200	201～300	301～400	401～500	501～600	601～800
7.5	10	M4	8	−0.005 −0.014	KSPSE	8	100～600	P≦F≦P×3 (L−B−F≧10)	4 5 6	Quotation					
8.5	10	M5	10			10	100～800		5 6 8						

Order

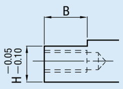
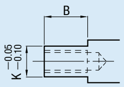
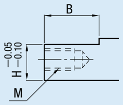
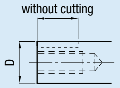
	Part Number	—	L	—	F	—	P
SCZN・SCZA Applications	K−KSPSE12	—	500	—	F25	—	P8
For SCY	KSPSE8	—	300	—	F20	—	P5

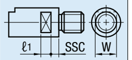
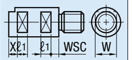
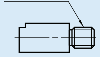
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	F	—	P(PMC)	—	(SC・SCW···etc.)
K−KSPSE20	—	300	—	F30	—	P17	—	SC−B16−H18

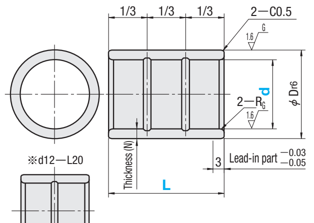
<table>
<tr><th>Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td> </td><td>SC</td><td>Flat edge cutting (1 plane)
Chamfering dimension can be changed.
B＝1mm increments, H＝1mm increments
⊗ Not available for D8・10
10≦B≦50　L−B−F≧10
Designation method SC−B16−H17
<table><tr><th>D</th><th>H</th><th>D</th><th>H</th></tr>
<tr><td>12</td><td>10≦H≦11</td><td>20</td><td>17≦H≦19</td></tr>
<tr><td>16</td><td>13≦H≦15</td><td>25</td><td>22≦H≦24</td></tr>
<tr><td></td><td></td><td>30</td><td>25≦H≦29</td></tr></table>
Note that the alteration (SC) is not applicable to slide unit.</td><td rowspan="4">Quotation</td></tr>
<tr><td> </td><td>SCW</td><td>Flat edge cutting (2 planes)
B＝1mm increments, K＝1mm increments
⊗ Not available for D8・10
10≦B≦50　L−B−F≧10
Designation method SCW−B16−K17
<table><tr><th>D</th><th>K</th><th>D</th><th>K</th></tr>
<tr><td>12</td><td>8≦K≦10</td><td>20</td><td>14≦K≦18</td></tr>
<tr><td>16</td><td>10≦K≦14</td><td>25</td><td>19≦K≦24</td></tr>
<tr><td></td><td></td><td>30</td><td>20≦K≦29</td></tr></table>
Note that the alteration (SCW) is not applicable to slide unit.</td></tr>
<tr><td> </td><td>SCM</td><td>Inclined pin holder alteration available for small loose core unit by changing dimensions of tap hole and edge cutting.
Available for D dimensions of KSPSE, K−KSPSE at 8, 10, 12.
⊗ Combination with SC and SCW not available.
Designation method SCM
<table><tr><th>D</th><th>M</th><th>B</th><th>H</th></tr>
<tr><td>8</td><td>M5</td><td>15</td><td>7.5</td></tr>
<tr><td>10</td><td>M6</td><td>17</td><td>9.5</td></tr>
<tr><td>12</td><td>M8</td><td></td><td>11</td></tr></table></td></tr>
<tr><td>without cutting
 </td><td>BHX</td><td>Not available for single flat edge cutting.</td></tr>
</table>

<table>
<tr><th>Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td> </td><td>SSC</td><td rowspan="2">Adds a wrench flat.
Designation method SSC5
SSC＝1mm increments
SSC＋ℓ1＋B＜L−F
SSC＝0 or SSC≧1
Adds two wrench flats.
Designation method WSC12−X8
WSC, X＝1mm increments
WSC＋X＋ℓ1×2＋B＜L−F
WSC＝0 or WSC≧1
X＝0 or X≧1
Positioning of the two wrench flats is not on the same plane.
<table><tr><th>D</th><th>W</th><th>ℓ1</th></tr>
<tr><td>8</td><td>7</td><td>8</td></tr>
<tr><td>10</td><td>8</td><td></td></tr>
<tr><td>12</td><td>10</td><td>10</td></tr>
<tr><td>16</td><td>14</td><td></td></tr>
<tr><td>20</td><td>17</td><td></td></tr>
<tr><td>25</td><td>22</td><td></td></tr>
<tr><td>30</td><td>27</td><td>15</td></tr></table>
The area (D dimension wise) within 10mm or so from the machined section of the wrench flat may have a lower hardness due to annealing.
The positional relation of the chamfered shaft end is arbitrary.</td><td rowspan="3">Quotation</td></tr>
<tr><td> </td><td>WSC</td></tr>
<tr><td>PMC (Fine Thread)
</td><td>PMC</td><td>Changes The male thread to fine thread in th table below.
Designation method PMC17
<table><tr><th>D</th><th colspan="4">PMC</th></tr>
<tr><td>8</td><td>4 5</td><td>6</td><td></td><td></td></tr>
<tr><td>10</td><td>5</td><td>6</td><td>8</td><td></td></tr>
<tr><td>12</td><td></td><td>6</td><td>8 10</td><td></td></tr>
<tr><td>16</td><td></td><td></td><td>8 10 12</td><td></td></tr>
<tr><td>20</td><td></td><td></td><td>10 12 15 17</td><td></td></tr>
<tr><td>25</td><td></td><td></td><td>12 15 17 20</td><td></td></tr>
<tr><td>30</td><td></td><td></td><td>15 17 20</td><td>25</td></tr>
<tr><td>Pitch</td><td>0.5</td><td>0.75</td><td>1.0</td><td>1.5</td></tr></table>
Use PMC to specify dimension P.
P dimension will be the same as PMC.</td></tr>
</table>

INCLINED PIN LEADER OIL-FREE BUSHINGS

—SINTERED ALLOY・THIN TYPE／COPPER ALLOY STANDARD TYPE—

RoHS **KPBZ** (Sintered alloy・thin type)

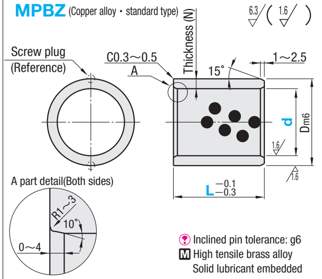

1/3
1/3
1/3
2−C0.5
1.6
6
2−R
1.6
d
φDr6
※d12−L20
Thickness (N)
L
3
Lead-in part −0.03 −0.05

Inclined pin tolerance: g6

M Sintered alloy

d	Tolerance	Dr6		Thickness (N)	Hole size (Recommended) (Hole size)	Hole size (Recommended) (H7)	R	Part Number Type	Part Number d	L	U/Price 1~9
12	+0.049 +0.038	16	+0.034 +0.023	2	16	+0.018 0	1.0	KPBZ	12	20	Quotation
16	+0.053 +0.042	21	+0.041 +0.028	2.5	21	+0.021 0			16	25	
										35	
20	+0.060 +0.047	26		3	26		1.5		20	30	
										35	
25	+0.065 +0.052	31	+0.050 +0.034	3	31	+0.025 0			25	35	

RoHS **MPBZ** (Copper alloy・standard type)


6.3/(1.6/)
Screw plug
(Reference)
C0.3~0.5
A
15°
Thickness (N)
1~2.5
d
Dm6
1.6
1.6
L −0.1 −0.3
A part detail(Both sides)
R1~3
10°
0~4

Inclined pin tolerance: g6

M High tensile brass alloy
Solid lubricant embedded

dF7		Dm6		Thickness (N)	Hole size (Recommended) (Hole size)	Hole size (Recommended) (H7)	Screw plugs (Recommended)	Part Number Type	Part Number d	L	U/Price 1~49
12	+0.034 +0.016	18	+0.018 +0.007	3	18	+0.018 0	M4× 8	MPBZ	12	20	Quotation
										25	
16		22	+0.021 +0.008	3	22	+0.021 0			16	20 25	
										30	
										35	
20	+0.041 +0.020	28		4	28		M5× 8		20	30	
										35	
										40	
25		33	+0.025 +0.009	4	33	+0.025 0			25	35	
										40	
										50	
30		38		4	38		M6×16		30	40	
										50	

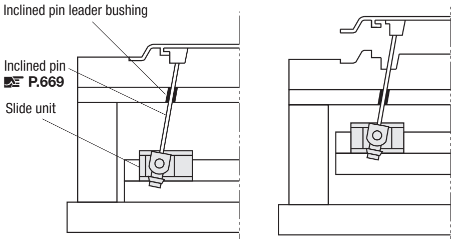
Order

Part Number	—	L
KPBZ20	—	30
MPBZ16	—	20

Days to Ship Quotation

Price Quotation

Example


Inclined pin leader bushing
Inclined pin
P.669
Slide unit

・Mold closed　・Mold opened

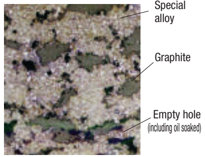
■**Features and scope of use**

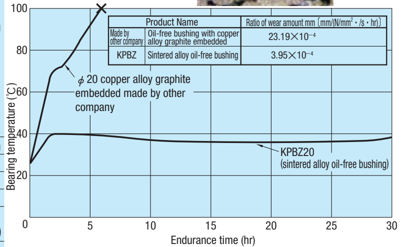
* Can also be used in an oil-free condition, but even better performance can be obtained by using running-in grease or oil.

	KPBZ (Sintered alloy・thin type)	MPBZ (Copper alloy・standard type)	
Characteristics	• Solid lubricant consisting mainly of graphite is finely dispersed through the sintered alloy, and the pores are impregnated with lubricating oil. • Has excellent coefficient of friction and wear resistance. The amount of oil impregnation is a high value of about 16%, ensuring stable performance over a long period. • There is no limit on the sliding direction. Because the solid lubricant is dispersed, the bushing can be adapted for short strokes, and can also be used for reciprocating motion, rocking and rotary motion as well.	• Solid lubricant is embedded in a base body of high strength brass. • Exhibits high performance under high load and low-speed operation conditions. • Can be used for reciprocating motion, rocking motion, frequent starting and stopping, etc.	
Lubrication	**Lubrication-free**	**Lubrication-free**	**Regular lubrication**
Operating temp range	−40~120℃	−40~200℃	−40~150℃
Allowable max. speed V	60m/min	30m/min	60m/min
Allowable max. load P	2900N/cm² (296kgf/cm²)	2900N/cm² (296kgf/cm²)	
Allowable max. PV value	9800N/cm²・m/min (1000kgf/cm²・m/min)	9900N/cm²・m/min (1010kgf/cm²・m/min)	19515N/cm²・m/min (1990kgf/cm²・m/min)
Hardness	90HRM(JIS Z2245)	HB210(JIS Z2243,2245)	

・Testing conditions
Testing machine : reciprocation testing machine
Bushing : d20-D28
Side pressure: 120N／mm²
(12kgf／mm²)
Speed : 30m／min (300spm)
Stroke amount : 50mm
Lubrication : spreading initial simple grease

・Burning alloy structure


Special alloy
Graphite
Empty hole
(including oil soaked)



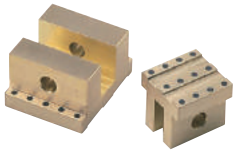
Product Name		Ratio of wear amount mm〔mm/(N/mm²・/s・hr)〕
Made by other company	Oil-free bushing with copper alloy graphite embedded	23.19×10⁻⁴
KPBZ	Sintered alloy oil-free bushing	3.95×10⁻⁴

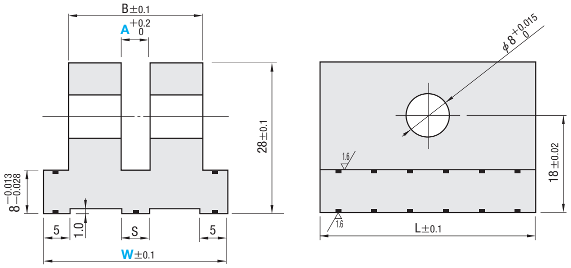
Transition of bearing temperature against different materials

OIL-FREE SLIDE BLOCKS FOR BLOCK LOOSE CORE

Non JIS material definition is listed on P.1351 - 1352

RoHS **SCK**




B±0.1
A +0.2 0
28±0.1
8 −0.013 −0.028
5
1.0
S
5
W±0.1
φ8 +0.015 0
1.6
1.6
18±0.02
L±0.1

A Dowel pin 1 pc.

M High strength brass casting class 4 (CAC304)
(Old JIS : HBsC4)
Special solid lubricant embedded

B	S	L	**A**	Part Number Type	Part Number W	A 1mm increments	U/Price 1~9
20	5	30	MS8−20	SCK	29	3~10	Quotation
25	5	40	MS8−25		34	3~15	
40	10	40	MS8−40		49	3~25	

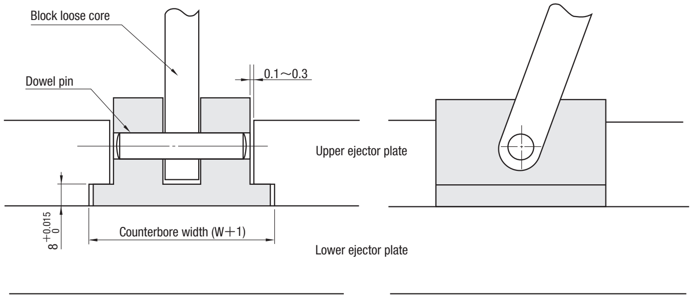
Order

Part Number	—	A
SCK34	—	10

Days to Ship Quotation

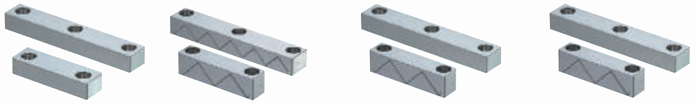
Price Quotation

Example (1) Insert the slide block between the top and bottom ejector plates.
(2) Fix the block loose core with the supplied φ8 dowel pin.

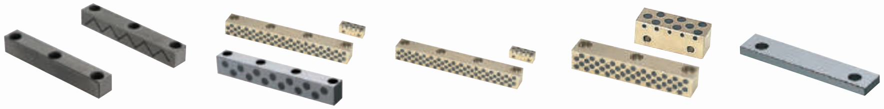

Block loose core
Dowel pin
0.1~0.3
Upper ejector plate
8 +0.015 0
Counterbore width (W+1)
Lower ejector plate

GUIDE RAILS/CENTER RAILS

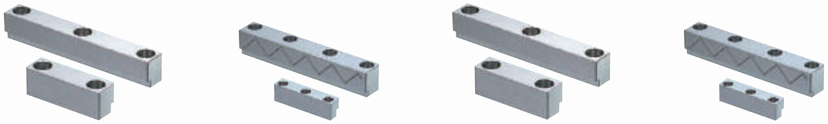
GUIDE RAILS CENTER RAILS



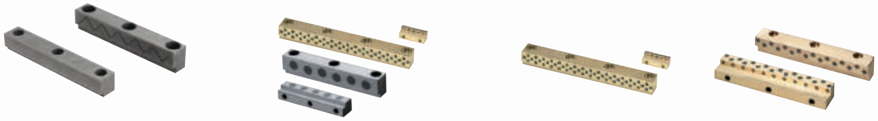
Product Name Part Number	Plain Guide Rails—Standard Non-oil groove — GRS	GRM	—Standard Oil groove — GRSM	GRMM	—L dimension designation type Non-oil groove · Oil groove — GRSF—☐H GRMF—☐H GRSFM—☐H GRMFM—☐H	—Free designation type Non-oil groove · Oil groove — FGRS—☐H FGRM—☐H FGRSM—☐H FGRMM—☐H
Page	685	685	685	685	687	689



Plain Guide Rails GRMT GRMMT	Oil-free Plain Guide Rails—Standard (Copper Alloy · SKS3)— GRZ GRSZ	—Bolt hole pitch designation type— GRZF—☐H	Oil-free Plain Guide Rails—Heat proof type— GRHZ	Plate Guide Rails GRPT GRPTC
691	693	694	695	696



Single-heel Guide Rails —Standard Non-oil groove (Groove 5 · 8 · 15mm)— GR5☐C GR5☐ GR8☐ GR15☐	Single-heel Guide Rails —Standard Oil groove (Groove 5 · 8 · 15mm)— GR5☐CM GR5☐M GR8☐M GR15☐M	—L dimension designation Non-oil groove · Oil groove (Groove 5 · 8mm)— GR5SF☐☐—☐H GR8SF☐—☐H GR5MF☐☐—☐H GR8MF☐—☐H	—Free desigaznation type Non-oil groove · Oil groove — FGR☐—☐H FGR☐M—☐H
697	697	699	701



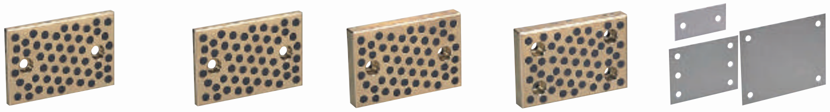
Single-heel Guide Rails GR5MT GR8MT GR5MMT GR8MMT	Oil-free Single Heel Guide Rails —Standard (Groove 5mm)— GR5Z GR5SZ	—Standard (Groove 8mm)— GR8Z GR8SZ	Oil-free Single Heel Guide Rails— Bolt hole pitch designation (Groove 5 · 8mm)— GR5ZF—☐H	GR8ZF—☐H	—Standard (Groove 15mm)— GR15Z
703	705	706	707	708	709

—With dowel hole— SRTL	Single-heel Guide Rails—V Dimension Standard Type (Groove 5 · 8mm)— GR5☐V GR8☐V	Double Heel Guide Rails—Free designation type— FGTSF☐M FGTMF☐M	Guide Rails GRAZF GRAZM
710	711	712	713

Center Rails —Standard Non-oil groove · Oil groove — CGS CGSM CGM	—L dimension designation Non-oil groove · Oil groove — CGRS CGRSM CGRM	—Free designation type— FCGS☐M FCGM☐M	Oil-free Center Rails—Standard— CGZ	—Bolt hole pitch designation— CGZF—☐H
715	716	717	719	720

Slide Adjustment Plates Non-oil groove · Oil groove SAS SAP SASM SAMM	Oil-free Slide Adjustment Plates SAPZ	Slide Adjustment Plates —Free designation type Non-oil groove · Oil groove — SAP☐☐H SAP☐M☐H	Oil-free Thin Slide Plates —Copper alloy 5mm type—UTW	—SKS3 (53～56HRC) 5mm type— UTWSZ
721	721	722	723	724

Oil-free Slide Plates —Copper alloy 10mm, 2-hole type—STW · STWT	—Copper alloy 10mm, 4-hole type— STW	Oil-free Slide Plates—SKS3 (53～56HRC) 10mm type— STWSZ	Compact Oil-free Slide Plates —Copper alloy 10mm type—STS
725	725	726	726

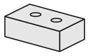
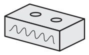
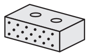


Oil-free Slide Plates Plate Thickness Plus Tolerance type —Copper alloy 10mm— PSLP	Oil-free Slide Plates —Copper alloy 10mm · Heat proof type—HPSLP	Oil-free Slide Plates —Copper alloy 20mm, 2-hole type—SEW · SEWT	—Copper alloy 20mm, 4-hole type— SEW	Shims for Oil-free Slide Plate SMP
727	728	729	729	730

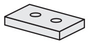
GUIDE FOR GUIDE RAILS・CENTER RAILS ①

Non JIS material definition is listed on P.1351 - 1352

■Plain Guide Rails

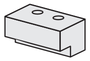
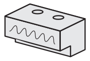
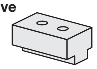
Shape	M H	Type							
		Standard		L dimension designation		Free designation		Nitriding	
Non-oil groove 	SKS3 (53～56HRC)	GRS	P.685	GRSF−□H	P.687	FGRS−□H	P.689	—	—
	HPM2T equivalent (37～41HRC)	GRM	P.685	GRMF−□H	P.687	FGRM−□H	P.689	GRMT	P.691
Oil groove 	SKS3 (53～56HRC)	GRSM	P.685	GRSFM−□H	P.687	FGRSM−□H	P.689	—	—
	HPM2T equivalent (37～41HRC)	GRMM	P.685	GRMFM−□H	P.687	FGRMM−□H	P.689	GRMMT	P.691
Oil-free 	Copper alloy + Special solid lubricant	GRZ	P.693	(Bolt hole pitch designation) GRZF−□H	P.694	—	—	—	—
	＜Heat proof type＞ Copper alloy + Special solid lubricant	GRHZ	P.695	—	—	—	—	—	—
	SKS3 (53～56HRC) + Special solid lubricant	GRSZ	P.693	—	—	—	—	—	—

■Plate Guide Rails

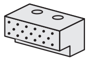
Shape	M H	Type			
		Standard		Plate	
	SKS3 (53～56HRC)	GRPT	P.696	GRPTC	P.696

Copper alloy is grade-4 high strength brass (CAC304). (Old JIS : HBsC4)

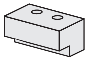
■Heel Guide Rails

Shape	M H	Heel height	Type							
			Standard		L dimension designation		Free designation		Nitriding	
Non-oil groove 	SKS3 (53～56HRC)	5	GR5SC GR5S	P.697	GR5SFC−□H GR5SF−□H	P.699	FGRA−□H	P.701	—	—
		8	GR8S		GR8SF−□H					
		15	GR15S		—	—				
	HPM2T equivalent (37～41HRC)	5	GR5MC GR5M	P.697	GR5MFC−□H GR5MF−□H	P.699	FGRB−□H	P.701	GR5MT	P.703
		8	GR8M		GR8MF−□H				GR8MT	
		15	GR15M		—	—			—	—
Oil groove 	SKS3 (53～56HRC)	5	GR5SCM GR5SM	P.697	GR5SFCM−□H GR5SFM−□H	P.699	FGRAM−□H	P.701	—	—
		8	GR8SM		GR8SFM−□H					
		15	GR15SM		—	—				
	HPM2T equivalent (37～41HRC)	5	GR5MCM GR5MM	P.697	GR5MFCM−□H GR5MFM−□H	P.699	FGRBM−□H	P.701	GR5MMT	P.703
		8	GR8MM		GR8MFM−□H				GR8MMT	
		15	GR15MM		—	—	—	—	—	—
Double-heel・Non-oil groove 	SKS3 (53～56HRC)	8	—	—	—	—	FGTSF□M	P.712	—	—
		11								
	HPM2T equivalent (37～41HRC)	8					FGTMF□M			
		11								

■Oil-free Heel Guide Rails

Shape	M H	Heel height	Type			
			Standard		Bolt hole pitch designation	
	Copper alloy + Special solid lubricant	5	GR5Z	P.705	GR5ZF−□H	P.707
		8・10	GR8Z SRTL	P.706 P.710	GR8ZF−□H	P.708
		15	GR15Z	P.709	—	—
	SKS3 (53～56HRC) + Special solid lubricant	5	GR5SZ	P.705	—	—
		8	GR8SZ	P.706		

■Heel Guide Rails -V Dimension Standard-

Shape	M H	Heel height	Type	
			Standard	
	SKS3 (53～56HRC)	5	GR5SV	P.711
		8	GR8SV	
	HPM2T equivalent (37～41HRC)	5	GR5MV	P.711
		8	GR8MV	

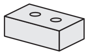
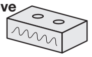
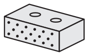
Copper alloy is grade-4 high strength brass (CAC304). (Old JIS : HBsC4)

■Guide Rails -Ant heel type- (P.713)

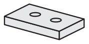
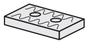
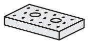
GUIDE FOR GUIDE RAILS・CENTER RAILS②

Non JIS material definition is listed on P.1351 - 1352

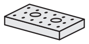
■Center Rails

Shape	M H	Type					
		Standard		L dimension designation		Free designation	
Non-oil groove 	SKS3 (53～56HRC)	CGS	P.715	CGRS	P.716	FCGS□M	P.717
	HPM2T equivalent (37～41HRC)	CGM	P.715	CGRM	P.716	FCGM□M	P.717
Oil groove 	SKS3 (53～56HRC)	CGSM	P.715	CGRSM	P.716	—	—
Oil-free 	Copper alloy ＋ Special solid lubricant	CGZ	P.719	CGZF—□H	P.720	—	—

■Slide Adjustment Plates

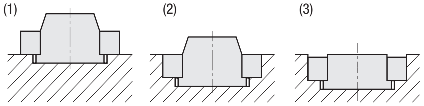
Shape	M H	Type			
		Standard		Free designation	
Non-oil groove 	SKS3 (53～56HRC)	SAS	P.721	SAPS□H	P.722
	HPM2T equivalent (37～41HRC)	SAP	P.721	SAPM□H	P.722
Oil groove 	SKS3 (53～56HRC)	SASM	P.721	SAPSM□H	P.722
	HPM2T equivalent (37～41HRC)	SAMM	P.721	SAPMM□H	P.722
Oil-free 	Copper alloy ＋ Special solid lubricant	SAPZ	P.721	—	—

■Oil-free Slide Adjustment Plates

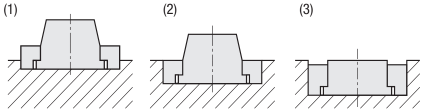
Shape	M H	Type							
		5mm Thickness (±0.025)		10mm Thickness ($^{+0.05}_{0}$)		10mm Thickness (±0.025)		20mm Thickness (±0.025)	
	Copper alloy ＋ Special solid lubricant	UTW	P.723	PSLP HPSLP (Heat proof type)	P.727 P.728	STW STWT	P.725	SEW SEWT	P.729
	Copper alloy (Small) ＋ Special solid lubricant	—	—	—	—	STS	P.726	—	—
	SKS3 (53～56HRC) ＋ Special solid lubricant	UTWSZ	P.724	—	—	STWSZ	P.726	—	—

ex Example

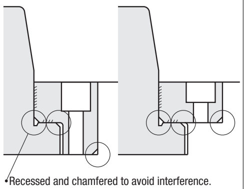
- Plain Type Guide Rails and Slide Cores



- Heel Type Guide Rails and Slide Cores

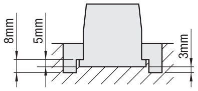


●Close-up of sliding section between a guide rail and sliding core

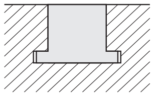


•Recessed and chamfered to avoid interference.

- Example of 8mm Heel Guide Rails and 5mm Thick Flange Slide Core

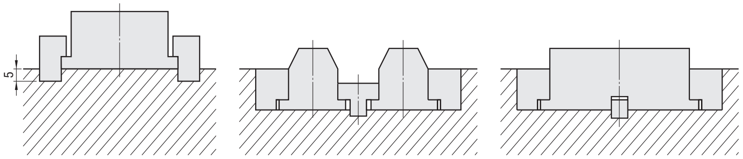


- Embedding a slide core for space saving



· Others

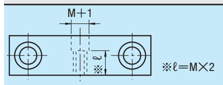
(1) Heel height of 15mm (2) Double heel type (3) Center rail



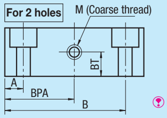
ALTERATION GUIDE FOR GUIDE RAILS · CENTER RAILS

Non JIS material definition is listed on P.1351 - 1352

Alteration

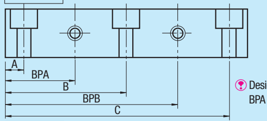


For 2 holes



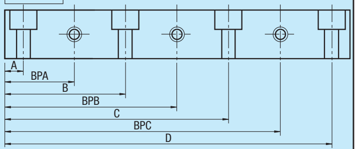
Designate BPA.

For 3 holes



Designate either BPA or BPB.

For 4 holes



Designate one of BPA, BPB or BPC.

Code

BP

Spec.

Apply hole boring to ball plungers for positioning.

※BP selection

W	BP
10 12.5	BP4(M4) BP5(M5) BP6(M6)
15	BP4(M4) BP5(M5) BP6(M6)
20 25	BP5(M5) BP6(M6) BP8(M8)
30 35 40	BP8(M8)

※BPA · BPB · BPC Range of designation

BP	M	BPA	BPB	BPC	BT
BP4	M4	A+8≦BPA≦B−8	B+8≦BPB≦C−8	C+8≦BPC≦L−8	$BT\geqq\frac{M}{2}+2$ $BT\leqq T-\frac{M}{2}-2$
BP5	M5	A+10≦BPA≦B−10	B+10≦BPB≦C−10	C+10≦BPC≦L−10	
BP6	M6	A+12≦BPA≦B−12	B+12≦BPB≦C−12	C+12≦BPC≦L−12	
BP8	M8				

Unit of designation

① BP=Select from the table above(M)
② BPA, BPB, BPC=1mm increments
③ BT=1mm increments

Note that only one place of ball plunger can be designated.

- For 2 holes, please designate BPA.
- For 3 holes, please designate either BPA or BPB.
- For 4 holes, please designate one of BPA, BPB or BPC.

⊗ Combination with KP not available.

1Code

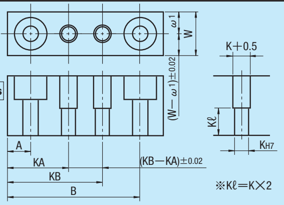
Quotation

Part Number	T	L	A	B	C	D	BP	BP(A~C)	BT
GRSF—4H10	10	100	A6.0	B16.0	C26.0	D36.0	BP4	BPA14	BT4

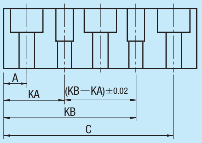
Quotation

Alteration

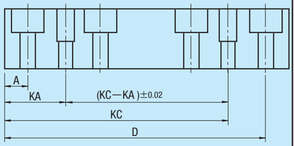
For 2 holes



For 3 holes



For 4 holes



Code

KP

Spec.

Apply two dowel hole borings for positioning.

1mm increments=KA, KB, KC
Number of bolt holes and KA, KB, KC are as follows.
2 holes **3 holes** =KA, KB designation
4 holes =KA, KC designation

Applicable to M HPM2T equivalent

Pitch tolerance of dowel hole (KB—KA for 2 holes and 3 holes, KC—KA for 4 holes, (W— ω 1)) is ±0.02.

Applicable sizes	K		KA	KB	KC
W10	4	$^{+0.012}_{0}$	2 holes A+8≦KA≦KB−8 3 holes 4 holes A+8≦KA≦B−8	2 holes KA+8≦KB≦B−8 3 holes B+8≦KB≦C−8	C+8≦KC≦D−8
W12.5					
W15	5		2 holes A+10≦KA≦KB−10 3 holes 4 holes A+10≦KA≦B−10	2 holes KA+10≦KB≦B−10 3 holes B+10≦KB≦C−10	C+10≦KC≦D−10
W20	6		2 holes A+12≦KA≦KB−12 3 holes 4 holes A+12≦KA≦B−12	2 holes KA+12≦KB≦B−12 3 holes B+12≦KB≦C−12	C+12≦KC≦D−12
W25	8	$^{+0.015}_{0}$			
W30					
W35					
W40					

⊗ Combination with BP not available.

1Code

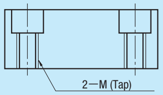
Quotation

Part Number	T	L	A	B	C	D	KA	KB	KC
GRMF—4H10	10	100	A6.0	B16.0	C26.0	D36.0	KA14		KC34

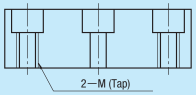
Quotation

Alteration

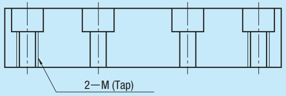
For 2 holes



For 3 holes



For 4 holes



Code

MC

Spec.

Process 2 places of tapping (both ends) for removal.
MC is automatically decided according to the dimension, dimension designation is unnecessary.

For **3 holes** or **4 holes**, process tapping on the bolt holes (d_2) of both ends.

Applicable to W10～25

W	T	d_1	d_2	M
10	10≦T≦15	8	4.5	M5
12.5	10≦T≦20	8	4.5	
15	10≦T≦25	9.5	5.5	M6
20	15≦T≦24	11	6.5	M8
	25≦T≦30	14	9	M10
25	20≦T≦35	14	9	

1Code

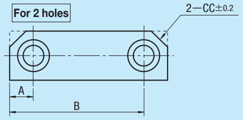
Quotation

Part Number	T	L	A	B	C	D	MC
GRSF—4H10	10	100	A6.0	B16.0	C26.0	D36.0	MC

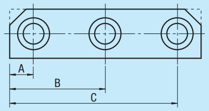
Quotation

Alteration

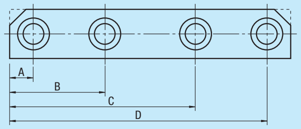
For 2 holes



For 3 holes



For 4 holes



Code

CC

Spec.

For mounting, C chamfering is processed.
※Possible to reduce the cavity insert pocket process and maintain precision

CC=seclection (CC5 · CC6 · CC9 · CC11 · CC13)

2 holes CC≦A—d_1/2 and CC≦(L—B)—d_1/2
3 holes CC≦A—d_1/2 and CC≦(L—C)—d_1/2
4 holes CC≦A—d_1/2 and CC≦(L—D)—d_1/2

CC (C size)	Applicable groove R
5	4R (ϕ 8 end milling)
6	5R (ϕ 10 end milling)
9	8R (ϕ 6 end milling)
11	10R (ϕ 20 end milling)
13	12R (ϕ 25 end milling)

1Code

Quotation

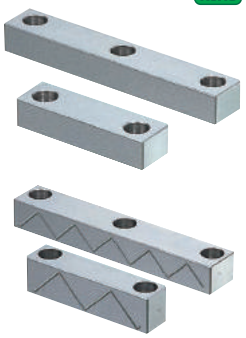
Part Number	T	L	A	B	C	D	CC
GRSF—4H10	20	100	A6.0	B16.0	C26.0	D36.0	CC5

Quotation

PLAIN GUIDE RAILS

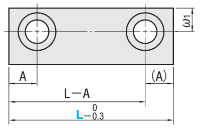
—NON-OIL GROOVE TYPE・OIL GROOVE TYPE—

RoHS

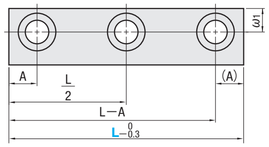


Part Number		M	H
Non-oil groove	Oil groove		
GRS	GRSM	SKS3	53～56HRC
GRM	GRMM	HPM2T equivalent	37～41HRC

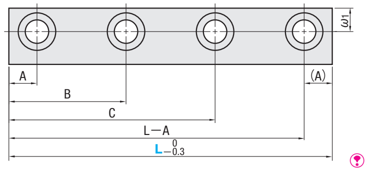
■Mounting bolt hole : 2



■Mounting bolt hole : 3



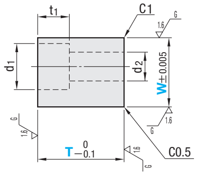
■Mounting bolt hole : 4



■Table for Bolt Hole Size

W	T	d1	d2	t1	ω1
10	5	8	4.5	3.5	4.5
	10・15			5	
12.5	5	8	4.5	3.5	5
	10・15・20			5	
15	5	8	4.5	3.5	6
	10・15・20・25	9.5	5.5	6	
20	15・20	11	6.5	7	9
	25・30	14	9	9	
25	20・25・30・35	14	9	9	10
30	30・35	17	11.5	11	11

Bolt hole dimension of T5 is available for Low Head Cap Screw (CBS). Note that standard socket head cap screw is too long to fit in.



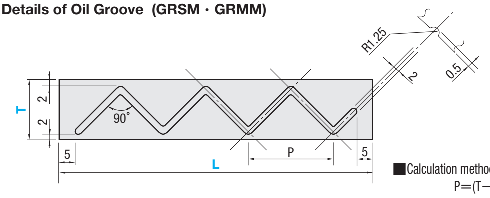
All corners C≦1 unless specified.

■Oil Groove Pitch

T	P
10	8
15	18
20	28
25	38
30	48
35	58

Please note that if L≦P+10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Details of Oil Groove (GRSM・GRMM)



■Calculation method for oil groove pitch
P=(T−6)×2

P **Price** Quotation

Non JIS material definition is listed on P.1351 - 1352

Part Number Type	W	T Selection	L	No. of bolt holes	A	B	C
Non-oil groove GRS (SKS3) GRM (HPM2T equivalent) Oil groove GRSM (SKS3) GRMM (HPM2T equivalent)	10	(5)	30 35 40	2	7.5	—	—
			50 60	3			
		10 15	*35 40	2			
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
	12.5	(5)	30 35 40	2	7.5	—	—
			50 60	3			
		10	*35	2			
		10 15 20	40				
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
	15	(5)	40 50 60	2	7.5	—	—
		10 15 20 25	40 50 60	2			
			70 80 90 100 110 120	3			
			130	4		40	90
			140			45	95
			150			53	97
	20	15 20 25 30	40 50 60 70 80 90	2	10	—	—
			100 110 120 130 140 150	3			
			160	4		55	105
			180			60	120
			200			70	130
	25	20 25 30	40 50 60 70 80 90	2	10	—	—
			100 110 120 130 140 150	3			
			160	4		55	105
			180			60	120
			200			70	130
Oil groove GRSM (SKS3) GRMM (HPM2T equivalent)		35	120 130 140 150	3		—	—
			160	4		55	105
			180			60	120
			200			70	130
	30	30 35	120 130 140 150	3	12	—	—
			160				
			180	4		60	120
			200			70	130

T5 is only applicable to GRS

L35 with * mark is only applicable to non-oil groove type, GRS and GRM.

Order

Part Number	—	T	—	L
GRS15	—	20	—	80

■GRSM List of sizes available for 3rd day shipment

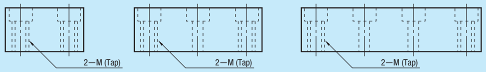
Type	W	T	L
GRSM	12.5	15	40・50・60・70・80・90・100
	15	15・20	

Days to Ship Quotation

Alterations

Part Number	—	T	—	L	—	(MC)
GRS15	—	20	—	80	—	MC

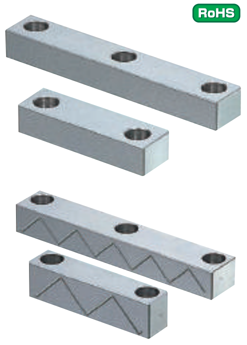
Quotation

Alteration	Code	Spec.	1Code
	MC	Process 2 places of tapping (both ends) for removal. Applicable to W10～25 Not applicable to T5	Quotation

W	T	M
10	10・15	M5
12.5	10・15・20	
15	10・15・20・25	M6
20	15・20	M8
	25・30	M10
25	20・25・30・35	

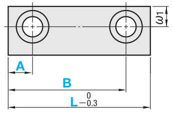
PLAIN GUIDE RAILS

—L DIMENSION DESIGNATION TYPE/NON-OIL GROOVE TYPE ・ OIL GROOVE TYPE—

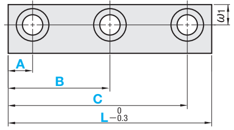


Part Number		M	H
Non-oil groove	Oil groove		
GRSF−□H	GRSFM−□H	SKS3	53～56HRC
GRMF−□H	GRMFM−□H	HPM2T equivalent	37～41HRC

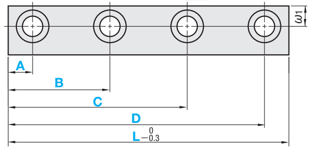
■Mounting bolt hole : 2 2H



■Mounting bolt hole : 3 3H

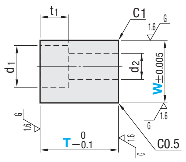


■Mounting bolt hole : 4 4H



■Table for Bolt Hole Size

W	T	d1	d2	t1	ω1
10	10・12.5・15	8	4.5	5	4.5
12.5	10・15・20				5
15	10・15・20・25	9.5	5.5	6	6
20	15・20	11	6.5	7	9
	25・30	14	9	9	
25	20・25・30・35				10
30	25・30・35	17	11.5	11	11
35	30・35				
40	30・40	19	12.5	13	13



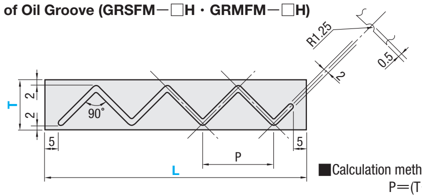
All corners C≦1 unless specified.

■Oil Groove Pitch

T	P
10	8
12.5	13
15	18
20	28
25	38
30	48
35	58
40	68

Please note that if L≦P+10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Details of Oil Groove (GRSFM−□H・GRMFM−□H)



■Calculation method for oil groove pitch
P=(T−6)×2

Order

Part Number	—	T	—	L	—	A	—	B	—	C	—	D
2H GRSF−2H10	—	10	—	75	—	A6	—	B16				
3H GRSF−3H10	—	10	—	100	—	A6	—	B16	—	C26		
4H GRSF−4H10	—	10	—	100	—	A6	—	B16	—	C26	—	D36

Days to Ship Quotation

Price Quotation

Non JIS material definition is listed on P.1351 - 1352

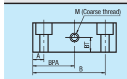
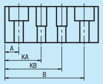
Part Number			T	L		Bolt hole pitch 0.5mm increments							
Type	No. (Bolt hole)	W	Selection	5mm increments		A		B		C		D	
						min.	max.	min.	max.	min.	max.	min.	max.
Non-oil groove GRSF (SKS3) GRMF (HPM2T equivalent) Oil groove GRSFM (SKS3) GRMFM (HPM2T equivalent)	2H 3H 4H	10	10 12.5 15	2H	*35・40～75	6	B−10	A+10	2H L−6 3H C−10 4H C−10	B+10	3H L−6 4H D−10	C+10	4H L−6
				3H	60～100								
				4H	100								
		12.5	10 15 20	2H	*35・40～75								
				3H	60～100								
				4H	100								
		15	10 15 20 25	2H	40～ 75	7	B−11.5	A+11.5	2H L−7 3H C−11.5 4H C−11.5	B+11.5	3H L−7 4H D−11.5	C+11.5	4H L−7
				3H	60～150								
				4H	100～150								
		20	15 20	2H	40～150	7.5	B−13	A+13	2H L−7.5 3H C−13 4H C−13	B+13	3H L−7.5 4H D−13	C+13	4H L−7.5
				3H	100～200								
				4H	155～200								
			25 30	2H	40～150	9	B−16	A+16	2H L−9 3H C−16 4H C−16	B+16	3H L−9 4H D−16	C+16	4H L−9
				3H	100～200								
				4H	155～200								
		25	20 25 30	2H	40～150								
				3H	100～200								
				4H	155～200								
			35	2H	120～150								
				3H	120～200								
				4H	155～200								
		30	25 30 35	2H	50～165	10.5	B−19	A+19	2H L−10.5 3H C−19 4H C−19	B+19	3H L−10.5 4H D−19	C+19	4H L−10.5
				3H	110～200								
				4H	190～200								
		35	30 35	2H	120～165								
				3H	120～200								
				4H	190～200								
		40	30 40	2H	50～165		B−21	A+21	2H L−10.5 3H C−21 4H C−21	B+21	3H L−10.5 4H D−21	C+21	4H L−10.5
				3H	110～200								
				4H	190～200								

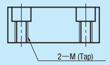
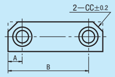
L35 with * mark is only applicable to non-oil groove type, GRSF and GRMF.

Alterations

Part Number	—	T	—	L	—	A	—	B	—	(BP・KP・MC・CC)
GRMF−2H10	—	10	—	75	—	A6	—	B36	—	MC

Quotation

Alterations	Code	Spec.	1Code
 	BP	Tapping Details P.683	Quotation
 	KP	Dowel hole boring Applicable to M HPM2T equivalent Details P.683	

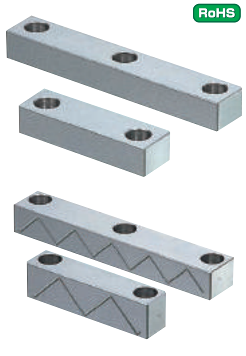
Alterations	Code	Spec.	1Code
 	MC	Change to tap hole Applicable to W10～25 Details P.684	Quotation
 	CC	C chamfering Details P.684	

Price Quotation

PLAIN GUIDE RAILS

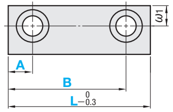
—FREE DESIGNATION TYPE/NON-OIL GROOVE TYPE・OIL GROOVE TYPE—

Non JIS material definition is listed on P.1351 - 1352

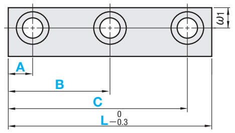


Part Number		M	H
Non-oil groove	Oil groove		
FGRS−□H	FGRSM−□H	SKS3	53～56HRC
FGRM−□H	FGRMM−□H	HPM2T equivalent	37～41HRC

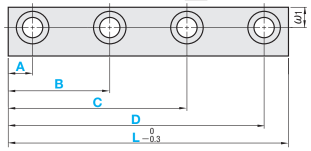
■Mounting bolt hole : 2 2H



■Mounting bolt hole : 3 3H

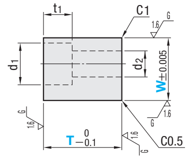


■Mounting bolt hole : 4 4H



■Table for Bolt Hole Size

W	T	d_1	d_2	t_1	ω1
10	10～20	8	4.5	5	4.5
12.5	10～30				5
15	10～40	9.5	5.5	6	6
20	15～24	11	6.5	7	9
	25～50	14	9	9	
25	20～50				10
30	25～50	17	11.5	11	11
35	30～35				
40	30～50	19	12.5	13	13



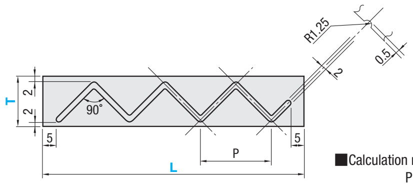
All corners C≦1 unless specified.

■Oil Groove Pitch

T	P
10～12	8
13～14	13
15～19	18
20～24	28
25～29	38
30～34	48
35～39	58
40～50	68

Please note that if L≦P+10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Details of Oil Groove (FGRSM−□H・FGRMM−□H)



■Calculation method for oil groove pitch
P＝(T−6)×2

Price Quotation

Part Number			T	L	Bolt hole pitch 0.5mm increments							
Type	No. (Bolt hole)	W	1mm increments	5mm increments	A		B		C		D	
					min.	max.	min.	max.	min.	max.	min.	max.
Non-oil groove **FGRS** (SKS3) **FGRM** (HPM2T equivalent) Oil groove **FGRSM** (SKS3) **FGRMM** (HPM2T equivalent)	2H 3H 4H	10	10～20	*35～100	6	B−10	A+10	2H L−6 3H C−10 4H C−10	B+10	3H L−6 4H D−10	C+10	4H L−6
		12.5	10～30									
		15	10～40	40～150	7	B−11.5	A+11.5	2H L−7 3H C−11.5 4H C−11.5	B+11.5	3H L−7 4H D−11.5	C+11.5	4H L−7
		20	15～24	40～200	7.5	B−13	A+13	2H L−7.5 3H C−13 4H C−13	B+13	3H L−7.5 4H D−13	C+13	4H L−7.5
			25～50		9	B−16	A+16	2H L−9 3H C−16 4H C−16	B+16	3H L−9 4H D−16	C+16	4H L−9
		25	20～50	40～200								
		30	25～50	50～200	10.5	B−19	A+19	2H L−10.5 3H C−19 4H C−19	B+19	3H L−10.5 4H D−19	C+19	4H L−10.5
		35	30～35	120～200								
		40	30～50	50～200		B−21	A+21	2H L−10.5 3H C−21 4H C−21	B+21	3H L−10.5 4H D−21	C+21	4H L−10.5

L35 with * mark is only applicable to non-oil groove type, FGRS and FGRM.

Order

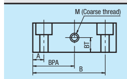
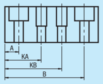
Part Number − T − L − A − B − C − D
2H FGRS−2H12.5 − 10 − 100 − A13.0 − B33.5
3H FGRS−3H12.5 − 10 − 100 − A13.0 − B33.5 − C54.5
4H FGRS−4H12.5 − 10 − 100 − A13.0 − B33.5 − C54.5 − D78.5

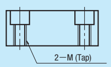
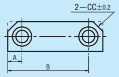
Days to Ship Quotation

Alterations

Part Number − T − L − A − B − (BP・KP・MC・CC)
FGRM−2H12.5 − 10 − 100 − A13.0 − B33.5 − MC

Quotation

Alterations	Code	Spec.	1Code
	BP	Tapping Details P.683	Quotation
	KP	Dowel hole boring Applicable to M HPM2T equivalent Details P.683	

Alterations	Code	Spec.	1Code
	MC	Change to tap hole Applicable to W10～25 Details P.684	Quotation
	CC	C chamfering Details P.684	

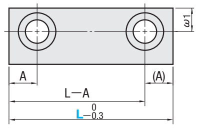
PLAIN GUIDE RAILS

—NITRIDING TYPE—

RoHS

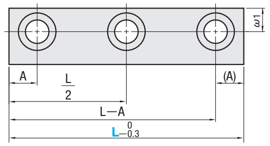
W	T	d_1	d_2	t_1	$\omega 1$
20	15 • 20	11	6.5	7	9
	25 • 30	14	9	9	
25	20 • 25 • 30	14	9	9	10

■Mounting bolt hole: 2

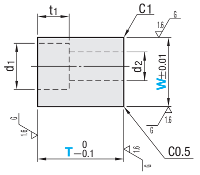


ω1
A
(A)
L−A
$L_{-0.3}^{\ 0}$

■Mounting bolt hole: 3



ω1
A
L/2
(A)
L−A
$L_{-0.3}^{\ 0}$



t1
C1
6
1.6
d1
d2
W±0.01
1.6
6
$T_{-0.1}^{\ 0}$
1.6
G
C0.5

All corners C≦1 unless specified.

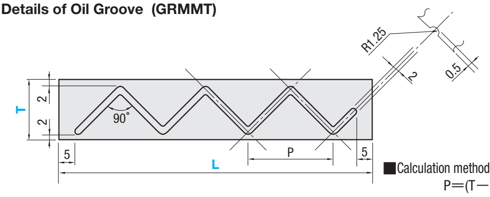
Part Number		M	H Base metal	H Surface
No Oil groove	Oil groove			
GRMT	**GRMMT**	HPM2T equivalent	37～41HRC	HV600～

■Oil Groove Pitch

T	P
15	18
20	28
25	38
30	48

Please note that if L≦P+10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Details of Oil Groove (GRMMT)



R1.25
2
0.5
T
2
2
90°
5
P
5
L

■Calculation method for oil groove pitch

P=(T−6)✕2

P Price **Quotation**

Non JIS material definition is listed on P.1351 - 1352

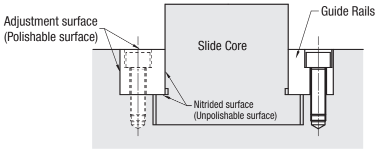
Part Number		T	L								No. of bolt holes	A
Type	W	Selection										
No Oil groove **GRMT** Oil groove **GRMMT**	**20**	**15** **20** **25** **30**	**80**	**90**							2	10
					100	**110**	**120**	**130**	**140**	**150**	3	
	25	**20** **25** **30**	**80**	**90**							2	
					100	**110**	**120**	**130**	**140**	**150**	3	

Order	Part Number	—	T	—	L
	GRMT20	—	**20**	—	**90**

Days to Ship **Quotation**

■Characteristics

- Since hardness of nitrided layer is high and coefficient of friction is extremely low as 0.05～0.12, abrasion resistance, corrosion resistance and burning resistance are improved.
- Since nitrided layer is about 5 μ, process surface other than sliding surface for alteration or adjustment.



Adjustment surface
(Polishable surface)
Slide Core
Guide Rails
Nitrided surface
(Unpolishable surface)

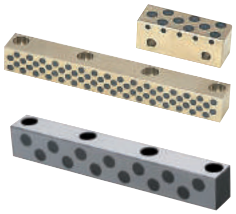
Though there is nitrided layer all over, avoid processing (polishing) any part used as sliding surface during use.

※Not to eliminate nitrided layer, process (polish) surface other than the sliding surface as shown in the left figure.

OIL-FREE PLAIN GUIDE RAILS

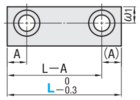
—STANDARD TYPE (COPPER ALLOY・SKS3)—

RoHS

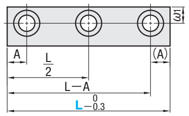


Part Number	M	H
GRZ	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded	—
GRSZ	SKS3 Special solid lubricant embedded	53~56HRC

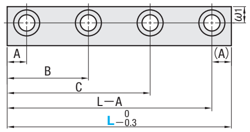
■Mounting bolt hole : 2



■Mounting bolt hole : 3

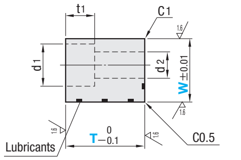


■Mounting bolt hole : 4



■Table for Bolt Hole Size

W	T	d_1	d_2	t_1	ω_1
12.5	10・15・20	8	4.5	5	5
15	10・15・20・25	9.5	5.5	6	6
20	15・20	11	6.5	7	9
	25・30	14	9	9	
25	20・25・30・35				10
30	30・35	17	11.5	11	11



GRSZ ····› Lubricant is not embedded in the lower surface.
All corners C≦1 unless specified.
Keep temperature under 80℃ or lower.

Part Number Type	W	T Selection	L	No. of bolt holes	A	B	C
GRZ (Copper alloy CAC304)	12.5	10 15 20	40	2	7.5	—	—
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
	15	10 15 20 25	40 50 60	2	7.5	—	—
			70 80 90 100 110 120	3			
			130	4		40	90
			140			45	95
			150			53	97
	20	15 20 25 30	40 50 60 70 80 90	2	10	—	—
			100 110 120 130 140 150	3			
			160	4		55	105
			180			60	120
			200			70	130
	25	20 25 30	40 50 60 70 80 90	2	10	—	—
			100 110	3			
		20 25 30 35	120 (130) 140 (150)				
			160	4		55	105
			180			60	120
			200			70	130
	30	30 35	120 140	3	12	—	—
			160				
			180	4		60	120
			200			70	130
GRSZ (SKS3)	15	10 15 20	40 50 60	2	7.5	—	—
			70 80 90 100 110 120	3			
	20	15 20 30	50 60 70 80 90	2	10		
			100 110 120 130 140 150	3			

L dimensions enclosed in parentheses are not available for T35.

Order

Part Number	—	T	—	L
GRZ15	—	20	—	80

Days to Ship **Quotation**

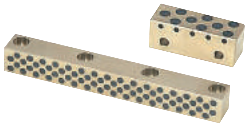
Price **Quotation**

OIL-FREE PLAIN GUIDE RAILS

—BOLT HOLE PITCH DESIGNATION TYPE (COPPER ALLOY)—

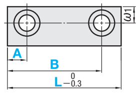
Non JIS material definition is listed on P.1351 - 1352

RoHS

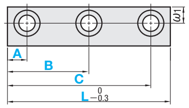


Part Number	M
GRZF−□H	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded

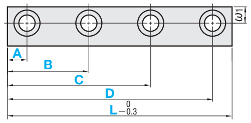
■Mounting bolt hole : 2 2H



■Mounting bolt hole : 3 3H

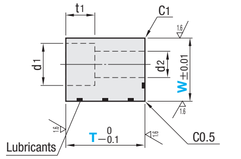


■Mounting bolt hole : 4 4H



■Table for Bolt Hole Size

W	T	d_1	d_2	t_1	ω_1
12.5	10・15・20	8	4.5	5	5
15	10・15・20・25	9.5	5.5	6	6
20	15・20	11	6.5	7	9
	25・30	14	9	9	
25	20・25・30・35				10
30	30・35	17	11.5	11	11



All corners C≦1 unless specified.
Keep temperature under 80℃ or lower.

Part Number			T	L		Bolt hole pitch 0.5mm increments							
						A		B		C		D	
Type	No. (Bolt hole)	W	Selection	10mm increments	20mm increments	min.	max.	min.	max.	min.	max.	min.	max.
GRZF (Copper alloy CAC304)	2H 3H 4H	12.5	10 15 20	2H 40~ 70	—	6	B−10	A+10	2H L−6	B+10	3H L−6	C+10	4H L−6
				3H 60~100					3H C−10				
				4H 100					4H C−10		4H D−10		
		15	10 15 20 25	2H 40~ 70	—	7	B−11.5	A+11.5	2H L−7	B+11.5	3H L−7	C+11.5	4H L−7
				3H 60~150					3H C−11.5				
				4H 100~150					4H C−11.5		4H D−11.5		
		20	15 20	2H 40~150	—	7.5	B−13	A+13	2H L−7.5	B+13	3H L−7.5	C+13	4H L−7.5
				3H 100~150	3H 160~200				3H C−13				
				—	4H 160~200				4H C−13		4H D−13		
			25 30	2H 40~150	—	9	B−16	A+16	2H L−9	B+16	3H L−9	C+16	4H L−9
				3H 100~150	3H 160~200				3H C−16				
				—	4H 160~200				4H C−16		4H D−16		
		25	20 25 30 *35	2H 40~150	2H 120~160								
				3H 100~150	3H 160~200								
				—	4H 160~200								
		30	30 35	—	2H 120~160	10.5	B−19	A+19	2H L−10.5	B+19	3H L−10.5	C+19	4H L−10.5
					3H 160~200				3H C−19				
					4H 180・200				4H C−19		4H D−19		

Specify L dimensions marked* in 20mm increments.

Order

	Part Number	—	T	—	L	—	A	—	B	—	C	—	D
2H	GRZF−2H15	—	10	—	70	—	A7	—	B19				
3H	GRZF−3H15	—	10	—	100	—	A7	—	B19	—	C31		
4H	GRZF−4H15	—	10	—	100	—	A7	—	B19	—	C31	—	D43

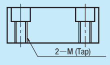
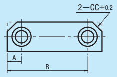
Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	T	—	L	—	A	—	B	—	(MC・CC)
GRZF−2H15	—	10	—	70	—	A7	—	B19	—	MC

Quotation

Alterations	Code	Spec.	1Code
 2−M (Tap)	MC	Change to tap hole Applicable to W12.5~25 **Details P.684**	Quotation
 2−CC±0.2 A B	CC	C chamfering **Details P.684**	

OIL-FREE PLAIN GUIDE RAILS

—HEAT RESISTANT 120℃ TYPE—

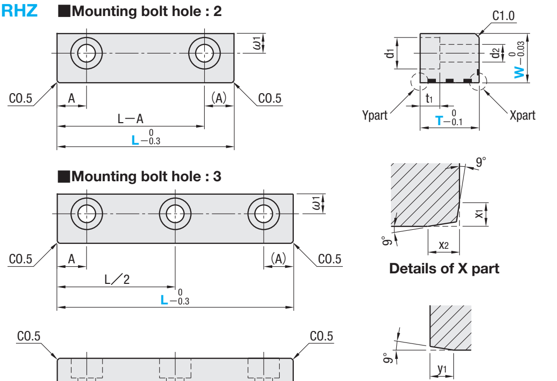
PLATE GUIDE RAILS

—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

GRHZ



■Mounting bolt hole : 2
ω1
C0.5
A
(A)
C0.5
L−A
L −0.3 0
C1.0
d1
d2
W −0.03 0
Ypart
t1
T −0.1 0
Xpart
■Mounting bolt hole : 3
ω1
C0.5
A
(A)
C0.5
L╱2
L −0.3 0
9°
x1
9°
x2
Details of X part
C0.5
C0.5
9°
y1
Details of Y part

Heat resistance temperature : 120℃ or lower
M Special high strength brass
Special solid lubricant

X part		Y part	d1	d2	t1	ω1	A	No. of bolt holes	Part Number		T Selection	L
x1	x2	y1							Type	W		
1.5	2	2	8	4.5	5	5	7.5	3	GRHZ	12.5	15	50 60 70
2	2	2	9.5	5.5	6	6		2		15	10	50 60
								3				70 80
								2			15	50 60
								3				70 80 90 100
2	2.5	2.5						2			20	50 60 70 80 90
								3				100

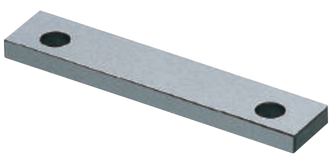
Order

Part Number	—	T	—	L
GRHZ15	—	10	—	50

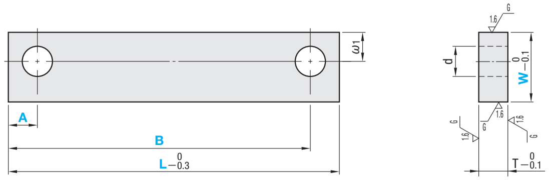
Days to Ship Quotation

■**Feature :** It can be used under higher temperature than conventiona oil-free plain guide rails.

RoHS



Part Number	M	H
GRPTC (Thin type)	SKS3	53～56HRC
GRPT (Standard type)		



ω1
A
B
L −0.3 0
1.6
6
d
W −0.1 0
1.6
6
1.6
6
1.6
6
T −0.1 0

All corners C≦1 unless specified. Note : T=5 of GSR in page 815 is similar-shaped. Recheck carefully before using.

d	ω1	T	Part Number		L	0.5mm increments		U/Price
			Type	W	5mm increments	A	B	1～9
4.5	4.5	3.5	**GRPTC** (Thin type)	10	25～ 40	6≦A≦B−10	B≦L−6	Quotation
					45～ 60			
		4	**GRPT** (Standard type)	10	25～ 40			
					45～ 60			
6.5	6	5		15	30～ 55	7.5≦A≦B−13	B≦L−7.5	
					60～ 80			
	9			20	30～ 55			
					60～ 80			
					85～100			

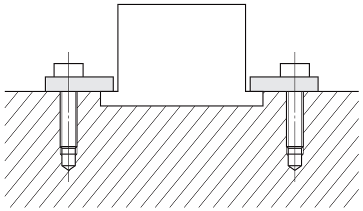
Order

Part Number	—	L	—	A	—	B
GRPT15	—	70	—	A13.0	—	B57.0

Price Quotation

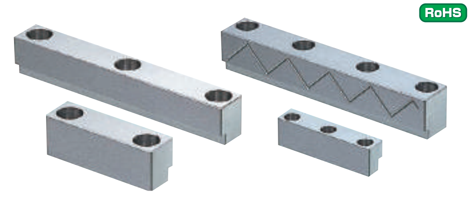
Days to Ship Quotation

Example



SINGLE-HEEL GUIDE RAILS

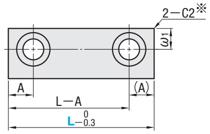
—STANDARD TYPE／NON-OIL GROOVE・OIL GROOVE TYPE (HEEL HEIGHT 5mm・8mm・15mm)—



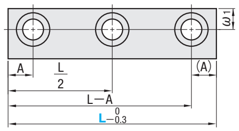
RoHS

Part Number		M	H	S (Heel height)	U	R
Non-oil groove	Oil groove					
GR5SC	GR5SCM	SKS3	53～56HRC	5	2.5	R≦0.3
GR5MC	GR5MCM	HPM2T equivalent	37～41HRC			
GR5S	GR5SM	SKS3	53～56HRC	5	3.5	R≦0.8
GR5M	GR5MM	HPM2T equivalent	37～41HRC			
GR8S	GR8SM	SKS3	53～56HRC	8	4.5	
GR8M	GR8MM	HPM2T equivalent	37～41HRC			
GR15S	GR15SM	SKS3	53～56HRC	15	5	
GR15M	GR15MM	HPM2T equivalent	37～41HRC			

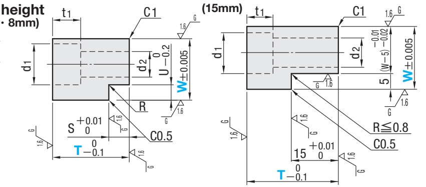
■Mounting bolt hole : 2



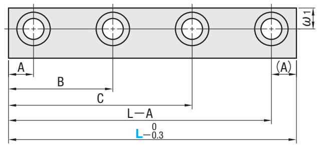
■Mounting bolt hole : 3



Heel height (5mm・8mm)



■Mounting bolt hole : 4



※Applicable only to guide groove height of 15mm (GR15□□). For a guide groove height of 5mm and 8mm (GR5□□ and GR8□□), C≦0.3.

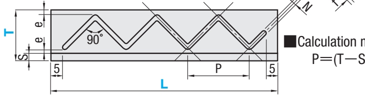
All corners C≦1 unless specified.

■Table for Bolt Hole Size

W	T	d1	d2	t1	ω 1
10	12.5・15	8	4.5	5	4.5
12.5	12.5・15・20	8	4.5	5	5
15	12.5・15・20・25	9.5	5.5	6	6
20	15・20	11	6.5	7	9
	25・30	14	9	9	
25	20・25・29・30・34	14	9	9	10
35	34・39	17	11.5	11	12

■Details of Oil Groove

(GR5SCM・GR5MCM
GR5SM・GR5MM
GR8SM・GR8MM
GR15SM・GR15MM)



■Calculation method for oil groove pitch
P＝(T−S−2e−N)×2

■Oil Groove Detail Dimensions

T−S	e	N	f	R
T−S≦7.5	1.5	1.5	0.3	1.0
T−S≧10	2.0	2.0	0.5	1.25

Please note that if L≦P＋10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Oil Groove Pitch

T−S	P
7	2
7.5	3
10	8
12	12
14・15	18
17	22
19・20	28
22	32
24・25	38

P Price **Quotation**

Non JIS material definition is listed on P.1351 - 1352

■Heel height 5mm・8mm

Part Number Type	W	T Selection	L	No. of bolt holes	A	B	C
Non-oil groove GR5SC (SKS3) GR5MC (HPM2T equivalent) Oil groove GR5SCM (SKS3) GR5MCM (HPM2T equivalent)	10	12.5(*1) 15	35(*1) 40	2	7.5	—	—
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
Non-oil groove GR5S (SKS3) GR5M (HPM2T equivalent) GR8M (HPM2T equivalent)	12.5	12.5 15	35(*1)	2	7.5	—	—
		12.5(*2) 15 20	40				
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
	15	12.5(*2) 15 20 25	40 50 60	2	7.5	—	—
			70 80 90 100 110 120	3			
			130	4		40	90
			140			45	95
			150			53	97
Oil groove GR5SM (SKS3) GR5MM (HPM2T equivalent) GR8SM (SKS3) GR8MM (HPM2T equivalent)	20	15(*2) 20 25 30	40 50 60 70 80 90	2	10	—	—
			100 110 120 130 140 150	3			
			160	4		55	105
			180			60	120
			200			70	130
	25	20 25 30	40 50 60 70 80 90	2	10	—	—
			100 110 120 130 140 150	3			
			160	4		55	105
			180			60	120
			200			70	130

* 1 only applicable to non-oil groove type/5mm heel type. * 2 only applicable to 5mm heel type.

■Heel height 15mm

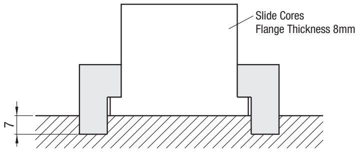
Part Number Type	W	T Selection	L	No. of bolt holes	A	B	C
Non-oil groove GR15S (SKS3) GR15M (HPM2T equivalent)	20	30	80 90	2	10	—	—
			100 110 120 130 140 150 160	3			
			180	4	20	60	120
			200			70	130
Non-oil groove GR15S (SKS3) GR15M (HPM2T equivalent)	25	29 34	60 70 80 90	2	10	—	—
			100 110 120 130 140 150 160	3			
			170 180	4	20	60	L−B
			190 200			70	L−B
Oil groove GR15SM (SKS3) GR15MM (HPM2T equivalent)	35	34 39	60 70 80 90 100	2	10	—	—
			110 120 130 140 150 160	3			
			170 180	4	20	60	L−B
			190 200			70	L−B

Order Part Number — T — L
GR5M15 — 20 — 80

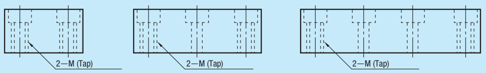
Days to Ship **Quotation**

Type	W	T	L
GR5S	12.5	12.5・15	40・50・60・70・80・90・100
GR5SM	15	12.5・15・20	
GR8S	12.5	15	
GR8SM	15	15・20	

Example Single-heel Guide Rails (Heel height 15mm)



Alterations Part Number — T — L — (MC)
GR5M 15 — 20 — 80 — MC
Quotation

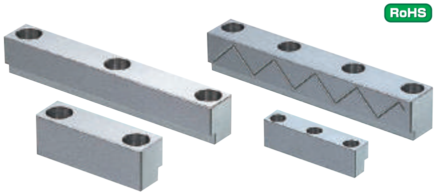
Alteration	Code	Spec.	1Code
 2−M (Tap) 2−M (Tap) 2−M (Tap)	MC	Process 2 places of tapping (both ends) for removal. Applicable to W10～25	Quotation

W	T	M
10	12.5・15	M5
12.5	12.5・15・20	
15	12.5・15・20・25	M6
20	15・20	M8
	25・30	M10
25	20・25・29・30・34	

SINGLE-HEEL GUIDE RAILS

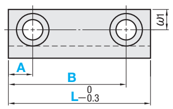
—L DIMENSION DESIGNATION TYPE／NON-OIL GROOVE・OIL GROOVE TYPE (HEEL HEIGHT 5mm・8mm)—

Non JIS material definition is listed on P.1351 - 1352

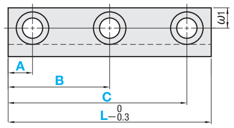


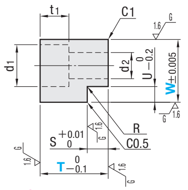
Part Number		M	H	S (Heel height)	U	R
Non-oil groove	Oil groove					
GR5SFC−□H	GR5SFCM−□H	SKS3	53～56HRC	5	2.5	R≦0.3
GR5MFC−□H	GR5MFCM−□H	HPM2T equivalent	37～41HRC			
GR5SF−□H	GR5SFM−□H	SKS3	53～56HRC	5	3.5	R≦0.8
GR5MF−□H	GR5MFM−□H	HPM2T equivalent	37～41HRC			
GR8SF−□H	GR8SFM−□H	SKS3	53～56HRC	8	4.5	
GR8MF−□H	GR8MFM−□H	HPM2T equivalent	37～41HRC			

■Mounting bolt hole : 2 2H

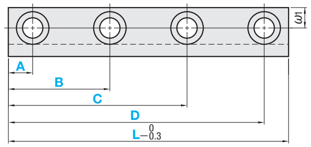


■Mounting bolt hole : 3 3H





■Mounting bolt hole : 4 4H



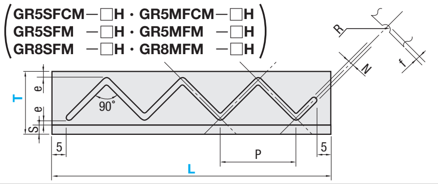
■Table for Bolt Hole Size

All corners C≦1 unless specified.

W	T	d1	d2	t1	ω 1
10	12.5・15	8	4.5	5	4.5
12.5	12.5・15・20				5
15	12.5・15・20・25	9.5	5.5	6	6
20	15・20	11	6.5	7	9
	25・30	14	9	9	
25	20・25・30				10
30	25・30・35	17	11.5	11	11
40	30・40	19	12.5	13	13

■Details of Oil Groove

GR5SFCM−□H・GR5MFCM−□H
GR5SFM −□H・GR5MFM −□H
GR8SFM −□H・GR8MFM −□H



■Calculation method for oil groove pitch

P＝(T−S−2e−N)×2

■Oil Groove Detail Dimensions

T−S	e	N	f	R
T−S≦7.5	1.5	1.5	0.3	1.0
T−S≧10	2.0	2.0	0.5	1.25

Please note that if L≦P+10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Oil Groove Pitch

T−S	P
7	2
7.5	3
10	8
12	12
15	18
17	22
20	28
22	32
25	38

Price Quotation

Part Number			T	L	Bolt hole pitch 0.5mm increments							
Type	No. (Bolt hole)	W	Selection	5mm increments	A		B		C		D	
					min.	max.	min.	max.	min.	max.	min.	max.
Non-oil groove GR5SFC (SKS3) GR5MFC (HPM2T equivalent) Oil groove GR5SFCM (SKS3) GR5MFCM (HPM2T equivalent)	2H 3H 4H	10	12.5 15	2H 35(*1)・40～ 75 3H 60～100 4H 100	6	B−10	A+10	2H L−6 3H C−10 4H C−10	B+10	3H L−6 4H D−10	C+10	4H L−6
Non-oil groove GR5SF (SKS3) GR5MF (HPM2T equivalent) GR8SF (SKS3) GR8MF (HPM2T equivalent) Oil groove GR5SFM (SKS3) GR5MFM (HPM2T equivalent) GR8SFM (SKS3) GR8MFM (HPM2T equivalent)		12.5	12.5(*2) 15 20	2H 35(*1)・40～ 75 3H 60～100 4H 100								
		15	12.5(*2) 15 20 25	2H 40～ 75 3H 60～150 4H 100～150	7	B−11.5	A+11.5	2H L−7 3H C−11.5 4H C−11.5	B+11.5	3H L−7 4H D−11.5	C+11.5	4H L−7
		20	15(*2) 20	2H 40～150 3H 100～200 4H 155～200	7.5	B−13	A+13	2H L−7.5 3H C−13 4H C−13	B+13	3H L−7.5 4H D−13	C+13	4H L−7.5
			25 30	2H 40～150 3H 100～200 4H 155～200	9	B−16	A+16	2H L−9 3H C−16 4H C−16	B+16	3H L−9 4H D−16	C+16	4H L−9
		25	20 25 30	2H 40～150 3H 100～200 4H 155～200								
		30	25 30 35	2H 50～165 3H 110～200 4H 190～200	10.5	B−19	A+19	2H L−10.5 3H C−19 4H C−19	B+19	3H L−10.5 4H D−19	C+19	4H L−10.5
		40	30 40	2H 50～165 3H 110～200 4H 190～200		B−21	A+21	2H L−10.5 3H C−21 4H C−21	B+21	3H L−10.5 4H D−21	C+21	4H L−10.5

(*1) L35 : only applicable to non-oil groove type. (*2) : only applicable to GR5SF・GR5SFM・GR5MF・GR5MFM

Order

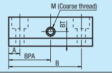
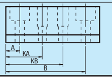
	Part Number	—	T	—	L	—	A	—	B	—	C	—	D
2H	GR5SF−2H12.5	—	15	—	70	—	A13.0	—	B29.0				
3H	GR5SF−3H12.5	—	15	—	70	—	A13.0	—	B29.0	—	C39.0		
4H	GR5SF−4H12.5	—	15	—	100	—	A13.0	—	B29.0	—	C39.0	—	D49.0

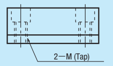
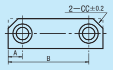
Days to Ship Quotation

Alterations

Part Number	—	T	—	L	—	A	—	B	—	(BP・KP・MC・CC)
GR5MF−2H12.5	—	15	—	70	—	A13.0	—	B29.0	—	MC

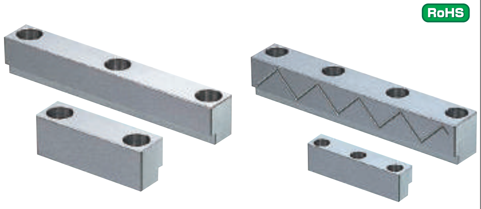
Quotation

Alterations	Code	Spec.	1Code
	BP	Tapping **Details P.683**	Quotation
	KP	Dowel hole boring Applicable to M HPM2T equivalent **Details P.683**	

Alterations	Code	Spec.	1Code
	MC	Change to tap hole Applicable to W10～25 **Details P.684**	Quotation
	CC	C chamfering **Details P.684**	

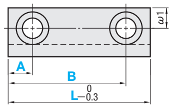
SINGLE-HEEL GUIDE RAILS

—FREE DESIGNATION TYPE／NON-OIL GROOVE・OIL GROOVE TYPE—

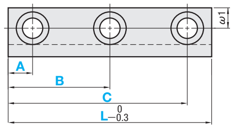


Part Number		M	H
Non-oil groove	Oil groove		
FGRA−□H	FGRAM−□H	SKS3	53～56HRC
FGRB−□H	FGRBM−□H	HPM2T equivalent	37～41HRC

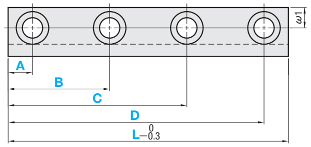
■Mounting bolt hole : 2 2H

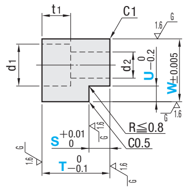


■Mounting bolt hole : 3 3H

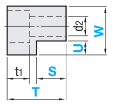


■Mounting bolt hole : 4 4H





■Heel Height (S) and Width (U) Settings



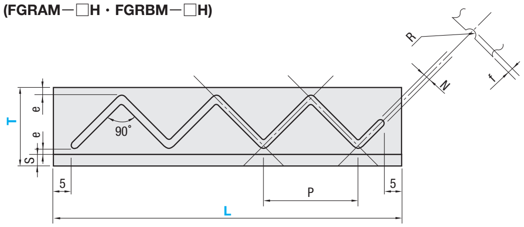
Setting Standard
S≦T−(t_1+2)
U≦W−($\omega_1+\frac{d_2}{2}$+1)

All corners C≦1 unless specified.

■Table for Bolt Hole Size

W	T	d_1	d_2	t_1	ω_1
10	10～20	8	4.5	5	4.5
12.5	10～30	8	4.5	5	5
15	10～14	8	4.5	5	5
	15～40	9.5	5.5	6	6
20	15～24	11	6.5	7	9
	25～50	14	9	9	9
25	20～50	14	9	9	10
30	25～50	17	11.5	11	11
40	30～50	19	12.5	13	13

■Details of Oil Groove (FGRAM−□H・FGRBM−□H)



■Calculation method for oil groove pitch

P=(T−S−2e−N)×2

■Oil Groove Detail Dimensions

T−S	e	N	f	R
T−S≦7.5	1.5	1.5	0.3	1.0
T−S≧10	2.0	2.0	0.5	1.25

Please note that if L≦P+10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Oil Groove Pitch

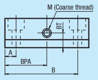
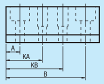
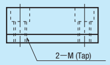
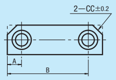
T−S	P
7	2
7.5	3
10	8
12	12
15	18
17	22
20	28
22	32
25	38

Alterations

Part Number − T − L − S − U − A − B − (BP・KP・MC・CC)

FGRB−2H15 − 30 − 145 − S12 − U3.5 − A15.0 − B40.5 − MC

Quotation

Alterations	Code	Spec.	1Code
	BP	Tapping Details P.683	Quotation
	KP	Dowel hole boring Applicable to M HPM2T equivalent Details P.683	
	MC	Change to tap hole Applicable to W10～25 Details P.684	Quotation
	CC	C chamfering Details P.684	

Non JIS material definition is listed on P.1351 - 1352

Part Number			T	L	S	U	Bolt hole pitch 0.5mm increments							
Type	No. (Bolt hole)	W	1mm increments	5mm increments	1mm increments	0.5mm increments	A		B		C		D	
							min.	max.	min.	max.	min.	max.	min.	max.
Non-oil groove FGRA (SKS3) FGRB (HPM2T equibalent) Oil groove FGRAM (SKS3) FGRBM (HPM2T equibalent)	2H 3H 4H	10	10～20	35* 40～100	Refer to the setting standard before designating.	Refer to the setting standard before designating.	6	B−10	A+10	2H L−6 3H C−10 4H C−10	B+10	3H L−6 4H D−10	C+10	4H L−6
		12.5	10～30											
		15	10～14	40～150										
			15～40				7	B−11.5	A+11.5	2H L−7 3H C−11.5 4H C−11.5	B+11.5	3H L−7 4H D−11.5	C+11.5	4H L−7
		20	15～24	40～200			7.5	B−13	A+13	2H L−7.5 3H C−13 4H C−13	B+13	3H L−7.5 4H D−13	C+13	4H L−7.5
			25～50				9	B−16	A+16	2H L−9 3H C−16 4H C−16	B+16	3H L−9 4H D−16	C+16	4H L−9
		25	20～50	40～200										
		30	25～50	50～200			10.5	B−19	A+19	2H L−10.5 3H C−19 4H C−19	B+19	3H L−10.5 4H D−19	C+19	4H L−10.5
		40	30～50	50～200			11.5	B−21	A+21	2H L−11.5 3H C−21 4H C−21	B+21	3H L−11.5 4H D−21	C+21	4H L−11.5

* L35 : only applicable to non-oil groove type

Order

Part Number − T − L − S − U − A − B − C − D

2H FGRA−2H15 − 30 − 145 − S12 − U3.5 − A15.0 − B40.5
3H FGRA−3H15 − 30 − 145 − S12 − U3.5 − A15.0 − B40.5 − C95.0
4H FGRA−4H15 − 30 − 145 − S12 − U3.5 − A15.0 − B40.5 − C95.0 − D13.0

Days to Ship Quotation

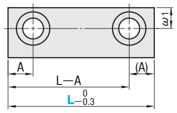
Price Quotation

SINGLE-HEEL GUIDE RAILS

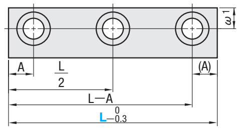
—NITRIDING TYPE—

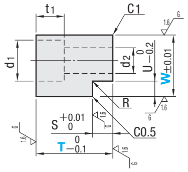
RoHS

■Mounting bolt hole: 2


ω1
A
L−A
(A)
L 0 −0.3

■Mounting bolt hole: 3


ω1
A
L/2
(A)
L−A
L 0 −0.3

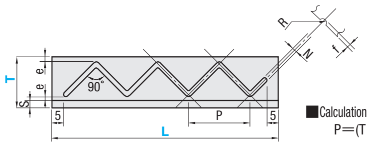

t1
C1
d1
d2
U 0 −0.2
W±0.01
R
S +0.01 0
C0.5
T 0 −0.1
1.6
6

All corners C≦1 unless specified.

Part Number		M	H Base metal	H Surface	S (Heel height)	U	R
No Oil groove	Oil groove						
GR5MT	GR5MMT	HPM2T equivalent	37～41HRC	HV600～	5	3.5	R≦0.8
GR8MT	GR8MMT				8	8	

W	T	d_1	d_2	t_1	ω 1
20	20	11	6.5	7	9
	25・30	14	9	9	

■Details of Oil Groove (GR5MMT, GR8MMT)


R
N
f
T
e
e
S
90°
5
P
5
L

■Calculation method for oil groove pitch
P＝(T−S−2e−N)×2

■Oil Groove Detail Dimensions

T−S	e	N	f	R
T−S≦7.5	1.5	1.5	0.3	1.0
T−S≧10	2.0	2.0	0.5	1.25

Please note that if L≦P＋10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

■Oil Groove Pitch

T−S	P
12	12
15	18
17	22
20	28
22	32
25	38

P Price **Quotation**

Non JIS material definition is listed on P.1351 - 1352

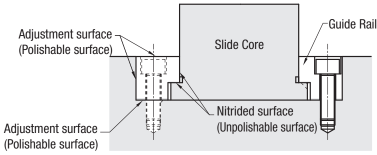
Part Number			T	L										No. of bolt holes	A
Type		W	Selection												
No Oil groove	GR5MT GR8MT	20	20 25 30	60	70	80	90							2	10
Oil groove	GR5MMT GR8MMT							100	110	120	130	140	150	3	

Order	Part Number	—	T	—	L
	GR5MMT20	—	20	—	90

Days to Ship **Quotation**

■Characteristics

- Since hardness of nitrided layer is high and coefficient of friction is extremely low as 0.05～0.12, abrasion resistance, corrosion resistance and burning resistance are improved.
- Since nitrided layer is about 5 μ, process surface other than sliding surface for alteration or adjustment.


Adjustment surface
(Polishable surface)
Slide Core
Guide Rails
Adjustment surface
(Polishable surface)
Nitrided surface
(Unpolishable surface)

Though there is nitrided layer all over, avoid processing (polishing) any part used as sliding surface during use.
※Not to eliminate nitrided layer, process (polish) surface other than the sliding surface as shown in the left figure.

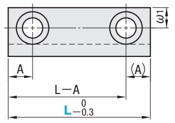
OIL-FREE SINGLE HEEL GUIDE RAILS

—STANDARD TYPE (HEEL HEIGHT 5mm／COPPER ALLOY・SKS3)—

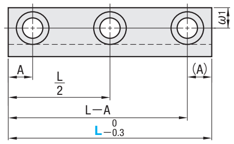
Bolt hole pitch designation type P.707

RoHS

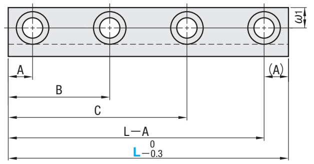
■Mounting bolt hole : 2



■Mounting bolt hole : 3

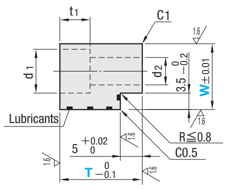


■Mounting bolt hole : 4



■Table for Bolt Hole Size

W	T	d1	d2	t1	ω1
12.5	12.5	8	4.5	5	5
	15				
	20				
15	15	9.5	5.5	6	6
	20				
	25				



Part Number	M	H
GR5Z	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded	—
GR5SZ	SKS3 Special solid lubricant embedded	53～56HRC

GR5SZ ···› Lubricating oil is not buried in the face that touches the top face of the slide core flange.

All corners C≦1 unless specified.

Keep temperature under 80℃ or lower.

Part Number		T	L	No. of bolt holes	A	B	C
Type	W	Selection					
GR5Z (Copper alloy CAC304)	12.5	12.5 15 20	40	2	7.5	—	—
			50 60 70	3			
		15 20	80	4		30	50
			90			32.5	57.5
			100			35	65
	15	15 20 25	40 50 60	2	7.5	—	—
			70 80 90 100 110 120	3			
			130	4		40	90
			140			45	95
			150			53	97
GR5SZ (SKS3)	12.5	15 20	40	2	7.5	—	—
			50 60 70	3			
			80	4		30	50
	15	15 20	40 50 60	2	7.5	—	—
			70 80	3			
		20	90 100				

Order

Part Number	—	T	—	L
GR5Z15	—	20	—	80

Days to Ship **Quotation**

Price **Quotation**

OIL-FREE SINGLE HEEL GUIDE RAILS

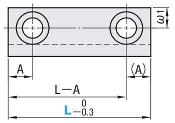
—STANDARD TYPE (HEEL HEIGHT 8mm／COPPER ALLOY・SKS3)—

Non JIS material definition is listed on P.1351 - 1352

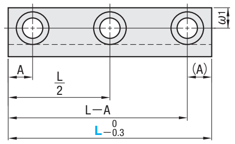
Bolt hole pitch designation type P.708

RoHS

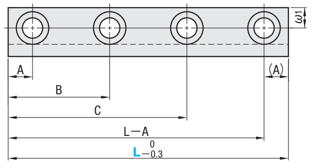
■Mounting bolt hole : 2



■Mounting bolt hole : 3

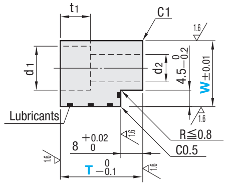


■Mounting bolt hole : 4



■Table for Bolt Hole Size

W	T	d1	d2	t1	ω1
12.5	15	8	4.5	5	5
	20				
15	15	9.5	5.5	6	6
	20				
	25				
	30				
20	15	11	6.5	7	9
	20				
	25	14	9	9	
	30				
	35				
25	20	14	9	9	10
	25				
	30				



Part Number	M	H
GR8Z	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded	—
GR8SZ	SKS3 Special solid lubricant embedded	53～56HRC

GR8SZ ···› Lubricating oil is not buried in the face that touches the top face of the slide core flange.

All corners C≦1 unless specified.

Keep temperature under 80℃ or lower.

Part Number		T	L	No. of bolt holes	A	B	C
Type	W	Selection					
GR8Z (Copper alloy CAC304)	12.5	15 20	40	2	7.5	—	—
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
	15	15 20 25	40 50 60	2	7.5	—	—
			70 80 90 100 110	3			
		15 20 25 30*	120				
			(130)	4		40	90
			140			45	95
			(150)			53	97
		30	160			55	105
			180			60	120
			200			70	130
	20	20 25 30	50 60 70 80 90	2	10	—	—
			100 110	3			
		20 25 30 35*	120 (130) 140 (150)				
			160	4		55	105
			180			60	120
			200			70	130
	25	20 25 30	60 90	2	10	—	—
			100 110 120 140 150	3			
			160	4		55	105
			180			60	120
			200			70	130
GR8SZ (SKS3)	15	20 25	40 50 60	2	7.5	—	—
			70 80 90 100 110 120	3			
			130	4		40	90
	20	20 25 30	60 70 80 90	2	10	—	—
			100 110 120 130	3			

L dimensions in parenthesis are not applicable to T dimension marked*.

Order

Part Number	—	T	—	L
GR8Z15	—	20	—	80

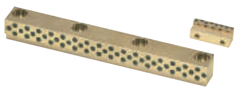
Days to Ship **Quotation**

Price **Quotation**

OIL-FREE SINGLE HEEL GUIDE RAILS

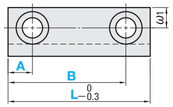
—BOLT HOLE PITCH DESIGNATION TYPE (HEEL HEIGHT 5mm／COPPER ALLOY)—

RoHS

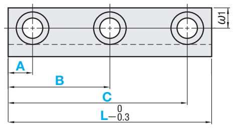


Part Number	M
GR5ZF	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded

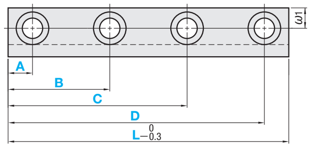
■Mounting bolt hole : 2 2H



■Mounting bolt hole : 3 3H

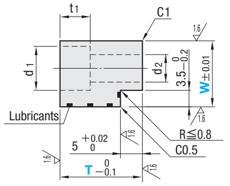


■Mounting bolt hole : 4 4H



■Table for Bolt Hole Size

W	T	d1	d2	t1	ω1
12.5	12.5	8	4.5	5	5
	15				
	20				
15	15	9.5	5.5	6	6
	20				
	25				
20	15	11	6.5	7	9
	20				
	25	14	9	9	
	30				
25	20	14	9	9	10
	25				
	30				



All corners C≦1 unless specified.
Keep temperature under 80℃ or lower.

Part Number			T	L		Bolt hole pitch 0.5mm increments							
						A		B		C		D	
Type	No. (Bolt hole)	W	Selection	10mm increments	20mm increments	min.	max.	min.	max.	min.	max.	min.	max.
GR5ZF (Copper alloy CAC304)	2H 3H 4H	12.5	12.5	2H 40～ 70	—	6	B−10	A+10	2H L−6 3H C−10 4H C−10	B+10	3H L−6 4H D−10	C+10	4H L−6
			15 20	2H 40～ 70									
				3H 60～100									
				4H 100									
		15	15 20 25	2H 40～ 70	—	7	B−11.5	A+11.5	2H L−7 3H C−11.5 4H C−11.5	B+11.5	3H L−7 4H D−11.5	C+11.5	4H L−7
				3H 60～150									
				4H 100～150									
		20	15 20	2H 40～150	—	7.5	B−13	A+13	2H L−7.5 3H C−13 4H C−13	B+13	3H L−7.5 4H D−13	C+13	4H L−7.5
				3H 100～150	3H 160～200								
				—	4H 160～200								
			25 30	2H 40～150	—	9	B−16	A+16	2H L−9 3H C−16 4H C−16	B+16	3H L−9 4H D−16	C+16	4H L−9
				3H 100～150	3H 160～200								
				—	4H 160～200								
		25	20 25 30	2H 40～150	—								
				3H 100～150	3H 160～200								
				—	4H 160～200								

Order

Part Number — T — L — A — B — C — D
2H GR5ZF−2H12.5 — 15 — 70 — A13.0 — B52.0
3H GR5ZF−3H12.5 — 15 — 70 — A13.0 — B29.0 — C59.0
4H GR5ZF−4H12.5 — 15 — 100 — A13.0 — B29.0 — C69.0 — D90.0

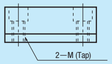
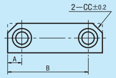
Days to Ship Quotation

Price Quotation

Alterations

Part Number — T — L — A — B — (MC · CC)
GR5ZF−2H12.5 — 15 — 70 — A13.0 — B52.0 — CC5

Quotation

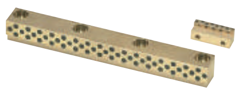
Alterations	Code	Spec.	1Code
 2−M (Tap)	MC	Change to tap hole Details P.684	Quotation
 2−CC±0.2 A B	CC	C chamfering Details P.684	

OIL-FREE SINGLE HEEL GUIDE RAILS

—BOLT HOLE PITCH DESIGNATION TYPE (HEEL HEIGHT 8mm／COPPER ALLOY)—

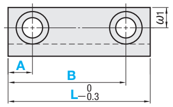
Non JIS material definition is listed on P.1351 - 1352

RoHS

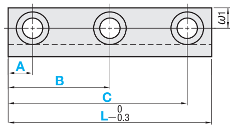


Part Number	M
GR8ZF	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded

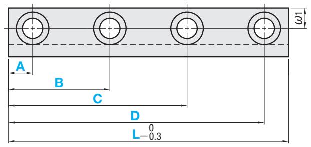
■Mounting bolt hole : 2 2H



■Mounting bolt hole : 3 3H

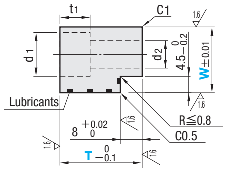


■Mounting bolt hole : 4 4H



■Table for Bolt Hole Size

W	T	d1	d2	t1	ω1
12.5	15	8	4.5	5	5
	20				
15	15	9.5	5.5	6	6
	20				
	25				
	30				
20	15	11	6.5	7	9
	20				
	25	14	9	9	
	30				
	35				
25	20	14	9	9	10
	25				
	30				



All corners C≦1 unless specified.
Keep temperature under 80℃ or lower.

Part Number			T	L		Bolt hole pitch 0.5mm increments							
						A		B		C		D	
Type	No. (Bolt hole)	W	Selection	10mm increments	20mm increments	min.	max.	min.	max.	min.	max.	min.	max.
GR8ZF (Copper alloy CAC304)	2H 3H 4H	12.5	15 20	2H 40～ 70	—	6	B−10	A+10	2H L−6 3H C−10 4H C−10	B+10	3H L−6 4H D−10	C+10	4H L−6
				3H 60～100									
				4H 100									
		15	15 20 25	2H 40～ 70	—	7	B−11.5	A+11.5	2H L−7 3H C−11.5 4H C−11.5	B+11.5	3H L−7 4H D−11.5	C+11.5	4H L−7
				3H 60～150									
				4H 100～150									
			30	—	3H 120～160								
					4H 120～200								
		20	15 20	2H 40～150	—	7.5	B−13	A+13	2H L−7.5 3H C−13 4H C−13	B+13	3H L−7.5 4H D−13	C+13	4H L−7.5
				3H 100～150	3H 160～200								
				—	4H 160～200								
			25 30	2H 40～150	—	9	B−16	A+16	2H L−9 3H C−16 4H C−16	B+16	3H L−9 4H D−16	C+16	4H L−9
				3H 100～150	3H 160～200								
			35	—	3H 120～160								
					4H 120～200								
		25	20 25 30	2H 40～150	—								
				3H 100～150	3H 160～200								
				—	4H 160～200								

Order

Part Number — T — L — A — B — C — D
2H GR8ZF−2H15 — 15 — 70 — A13.0 — B52.0
3H GR8ZF−3H15 — 15 — 70 — A13.0 — B29.0 — C59.0
4H GR8ZF−4H15 — 15 — 100 — A13.0 — B29.0 — C69.0 — D90.0

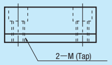
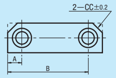
Days to Ship Quotation

Price Quotation

Alterations

Part Number — T — L — A — B — (MC · CC)
GR8ZF−2H15 — 15 — 70 — A13.0 — B52.0 — CC5

Quotation

Alterations	Code	Spec.	1Code
 2−M (Tap)	MC	Change to tap hole Details P.684	Quotation
 2−CC±0.2 A B	CC	C chamfering Details P.684	

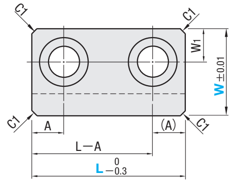
OIL-FREE SINGLE HEEL GUIDE RAILS

—STANDARD TYPE (HEEL HEIGHT 15mm／COPPER ALLOY)—

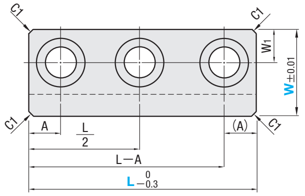
RoHS

GR15Z

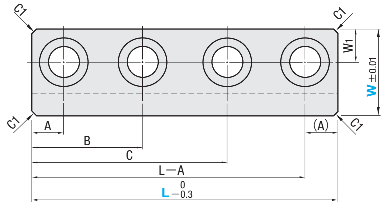
■**Mounting bolt hole : 2**

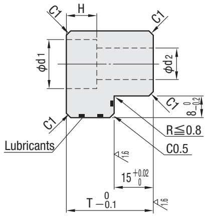

C1
C1
C1
C1
W1
W±0.01
A
(A)
L−A
L 0 −0.3

■**Mounting bolt hole : 3**


C1
C1
C1
C1
W1
W±0.01
A
L/2
(A)
L−A
L 0 −0.3

■**Mounting bolt hole : 4**


C1
C1
C1
C1
W1
W±0.01
A
B
C
(A)
L−A
L 0 −0.3


C1
H
C1
ϕd1
ϕd2
C1
C1
8 0 −0.2
R≦0.8
C0.5
Lubricants
1.6
15 +0.02 0
T 0 −0.1
1.6

M Grade-4 high strength brass
(CAC304)
(Old JIS : HBsC4)
Special solid lubricant embedded

Keep temperature under 80℃ or lower.

T	W1	d1	d2	H	No. of bolt holes	A	B	C	Part Number Type	Part Number W	L	U/Price 1〜9
30	7.5	11	7	7	2	20	—	—	GR15Z (Copper alloy CAC304)	23	80	Quotation
							—	—			100	
					3		—	—			120	
							—	—			140	
							—	—			160	
							—	—			180	
					4		70	130			200	
							80	140			220	
35	10	14	9	9	2	20	—	—		28	80	
							—	—			100	
					3		—	—			120	
							—	—			140	
							—	—			160	
							—	—			180	
					4		70	130			200	
							80	140			220	

Order

Part Number	—	L
GR15Z23	—	120

Price Quotation

Days to Ship Quotation

OIL-FREE GUIDE RAILS

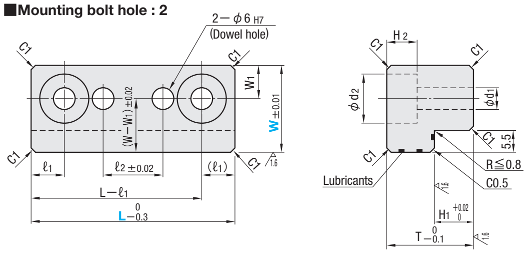
— DOWEL HOLE TYPE —

Non JIS material definition is listed on P.1351 - 1352

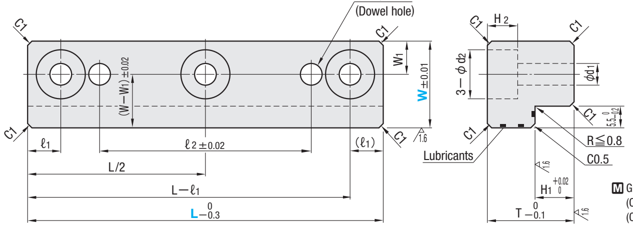
RoHS

SRTL

■**Mounting bolt hole : 2**


2−ϕ6 H7
(Dowel hole)
C1
C1
C1
C1
W1
W±0.01
(W−W1)±0.02
ℓ1
ℓ2±0.02
(ℓ1)
L−ℓ1
L 0 −0.3
1.6
H2
C1
C1
ϕd2
ϕd1
C1
C1
5.5
R≦0.8
C0.5
Lubricants
1.6
H1 +0.02 0
T 0 −0.1
1.6

■**Mounting bolt hole : 3**


2−ϕ6 H7
(Dowel hole)
C1
C1
C1
C1
W1
W±0.01
(W−W1)±0.02
ℓ1
ℓ2±0.02
(ℓ1)
L/2
L−ℓ1
L 0 −0.3
1.6
H2
C1
C1
3−ϕd2
ϕd1
C1
C1
5.5 0 −0.2
R≦0.8
C0.5
Lubricants
1.6
H1 +0.02 0
T 0 −0.1
1.6

M Grade-4 high strength brass
(CAC304)
(Old JIS : HBsC4)
Special solid lubricant embedded

Keep temperature under 80℃ or lower.

T	W1	ℓ1	ℓ2	d1	d2	H1	H2	No. of bolt holes	Part Number Type	Part Number W	L	U/Price 1〜4
15	6	7.5	20	5.5	9.5	8	6	2	SRTL (Copper alloy CAC304)	15	60	Quotation
			40					3			80	
			50								100	
			75								120	
20	8	10	35	9	14		9	2		20	80	
			50					3			100	
			75								120	
			90								140	
25	9		35			10		2		25	80	
			50					3			100	
			75								120	
			90								140	
			120								160	

Order

Part Number	—	L
SRTL20	—	120

Price Quotation

Days to Ship Quotation

SINGLE-HEEL GUIDE RAILS

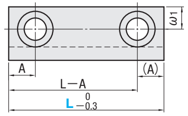
—V DIMENSION STANDARD TYPE (HEEL HEIGHT 5mm・8mm TYPE)—

RoHS

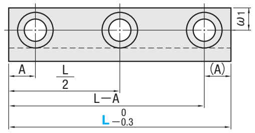
Part Number	M	H	Heel height=S	V	R
GR5SV	SKS3	53～56HRC	5	(W−2.5)	R≦0.8
GR5MV	HPM2T equivalent	37～41HRC			
GR8SV	SKS3	53～56HRC	8	(W−4.5)	
GR8MV	HPM2T equivalent	37～41HRC			

Note that the S dimension tolerance is different from that of heel height 10mm, 12mm and 15mm types.

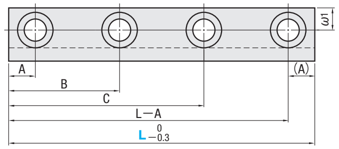
■Mounting bolt hole : 2


ω1
A
(A)
L−A
$L^{0}_{-0.3}$

■Mounting bolt hole : 3

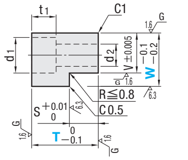

ω1
A
L/2
(A)
L−A
$L^{0}_{-0.3}$

■Mounting bolt hole : 4


ω1
A
B
C
(A)
L−A
$L^{0}_{-0.3}$

■Table for Bolt Hole Size

W	T	d_1	d_2	t_1	ω1
12.5	12.5・15・20	8	4.5	5	5
15	15・20・25	9.5	5.5	6	6
20	20	11	6.5	7	9
	25・30	14	9	9	


t1
C1
d1
d2
V ±0.005
W −0.1 −0.2
R≦0.8
C0.5
S +0.01 0
T 0 −0.1
1.6
6.3
G

All corners C0.5 unless specified.

Part Number Type	W	T Selection	L	No. of bolt holes	A	B	C
GR5SV **GR5MV**	12.5	12.5 15 20	40	2	7.5	—	—
			50 60 70	3			
			80	4		30	50
	15	15 20 25	40 50 60	2	7.5	—	—
			70 80 90 100	3			
GR8SV **GR8MV**	15	15 20 25	40 50 60	2	7.5	—	—
			70 80 90 100	3			
	20	20 25 30	60 70 80 90	2	10	—	—
			100 110 120	3			

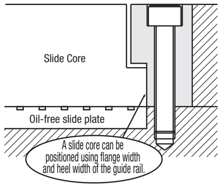
Order

Part Number	—	T	—	L
GR5SV15	—	15	—	60

Days to Ship Quotation

Price Quotation

Example Enables positioning in horizontal direction of the slide core with the heel.


Slide Core
Oil-free slide plate
A slide core can be positioned using flange width and heel width of the guide rail.

DOUBLE HEEL GUIDE RAILS

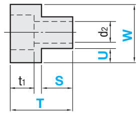
—FREE DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

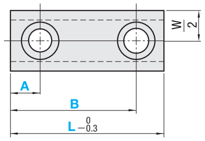
Part Number	M	H
FGTSF2M・FGTSF3M・FGTSF4M	SKS3	53～56HRC
FGTMF2M・FGTMF3M・FGTMF4M	HPM2T equivalent	37～41HRC

■Heel Height (S) and Width (U) Settings

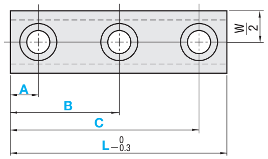


Setting Standard
$S \leqq T-(t_1+2)$
$U \leqq \frac{W}{2}-(\frac{d_2}{2}+1)$

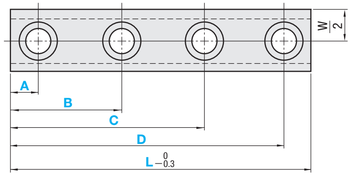
■Mounting bolt hole : 2



■Mounting bolt hole : 3

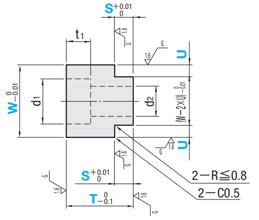


■Mounting bolt hole : 4


W/2
A
B
C
D
$L^{0}_{-0.3}$

■Table for Bolt Hole Size

W	T	d_1	d_2	t_1
15	15～20	8	4.5	5
18	15～30	9.5	5.5	6
22・26	20～24	11	6.5	7
	25～40	14	9	9
32・38	25～50	17	11.5	11


S +0.01 0
t1
U
W −0.01 0
d1
d2
(W−2×U) 0 −0.01
S +0.01 0
T 0 −0.1
2−R≦0.8
2−C0.5
1.6
G

All corners C≦1 unless specified.

Part Number Type	W	T 1mm increments	L 5mm increments	S 1mm increments	U 0.5mm increments	Bolt hole pitch 0.5mm increments A	B	C	D
FGTSF2M(2 holes) **FGTSF3M**(3 holes) **FGTSF4M**(4 holes) (SKS3)	15	15～20	40～100	Refer to the setting standard before designating.	Refer to the setting standard before designating.	6≦A≦B−10	A+10≦B≦C−10	B+10≦C≦D−10	C+10≦D≦L−6
	18	15～30	40～100			7≦A≦B−11.5	A+11.5≦B≦C−11.5	D+11.5≦C≦D−11.5	C+11.5≦D≦L−7
	22	20～40	40～150			T<25 7.5<A≦B−13 T≧25 9<A≦B−16	T<25 A+13≦B≦C−13 T≧25 A+16≦B≦C−16	T<25 B+13≦C≦D−13 T≧25 B+16≦C≦D−16	T<25 C+13≦D≦L−7.5 T≧25 C+16≦D≦L−9
FGTMF2M(2 holes) **FGTMF3M**(3 holes) **FGTMF4M**(4 holes) (HPM2T equivalent)	26	20～40	40～150						
	32	25～50	50～200			10.5≦A≦B−19	A+19≦B≦C−19	B+19≦C≦D−19	C+19≦D≦L−10.5
	38	25～50	50～200						

Order

Part Number	—	T	—	L	—	S	—	U	—	A	—	B	—	C	—	D
FGTMF4M 22	—	30	—	145	—	S12	—	U4.0	—	A15.0	—	B40.5	—	C95.0	—	D130.0

Days to Ship Quotation

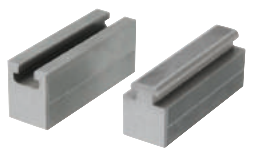
Price Quotation

Guide Rails

—Ant heel type—

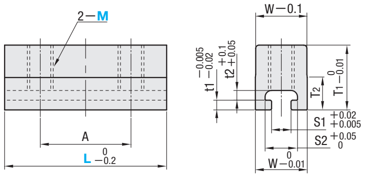
Non JIS material definition is listed on P.1351 - 1352

RoHS



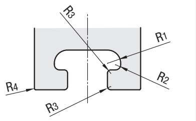
When combined: GRAZF+GRAZM

GRAZF



2−M
A
L $^{0}_{-0.2}$
W−0.1
t1 $^{-0.005}_{-0.02}$
t2 $^{+0.1}_{+0.05}$
T2
T1 $^{0}_{-0.01}$
S1 $^{+0.02}_{+0.005}$
S2 $^{+0.05}_{0}$
W $^{0}_{-0.01}$

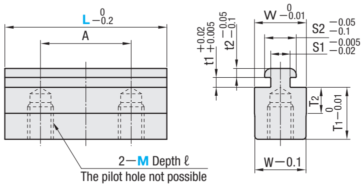
Ant heel details



R3
R1
R2
R4
R3

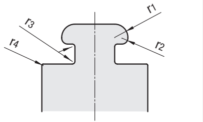
Part Number		R1	R2	R3	R4
Type	No.				
GRAZF	8	1.0	0.2	0.25	0.1
	12	1.5	0.2	0.25	0.1

GRAZM



L $^{0}_{-0.2}$
A
W $^{0}_{-0.01}$
t1 $^{+0.02}_{+0.005}$
t2 $^{-0.05}_{-0.1}$
S2 $^{-0.05}_{-0.1}$
S1 $^{-0.005}_{-0.02}$
T2
T1 $^{0}_{-0.01}$
W−0.1

2−M Depth ℓ
The pilot hole not possible



Part Number		r1	r2	r3	r4
Type	No.				
GRAZM	8	1.0	0.25	0.2	0.1
	12	1.5	0.25	0.2	0.1

M SKD11(HRC58～60)

W	S1	S2	T1	T2	t1	t2	A	M×ℓ	Part Number		L	U/Price
									Type	No.		1～9
8	3	5	10	5	1.5	1.5	14	4	GRAZF	8	25	Quotation
12	4	7	12	7.5	2	2	18	6		12	30	
8	3	5	8	4	1.5	1.5	14	4×5	GRAZM	8	25	
12	4	7	10	6	2	2	18	6×7		12	30	

T2 is W usable range.

	Part Number	—	L
Order	GRAZM8	—	25

Days to Ship **Quotation**

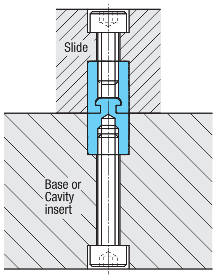
Price **Quotation**

Characteristics

- No guide rail next to the slide core allows slide mechanism miniaturization and better protection from interference.
- As compared to the guide rail structure, this is less effected by thermal expansion because this is mounted inside the slide core.
- This helps prevent the wide slide core from galling.
- Connecting multiple rails allows a long stroke.

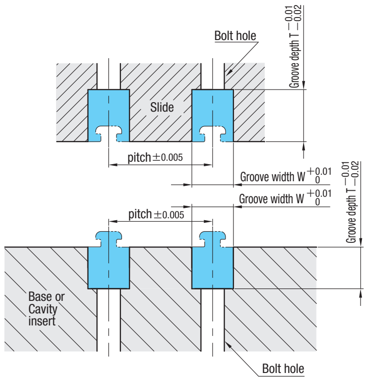
How to mount

- Make a countersunk hole for a mounting bolt and a groove for the rail on a base and a slide core and fix them with a bolt.
- Refer to the right diagram for the groove dimension.
- If the slide core does not move smoothly, check the clearance and the slot pitch (parallelism) of the groove width and the rail width W and adjust it.



Slide
Base or Cavity insert

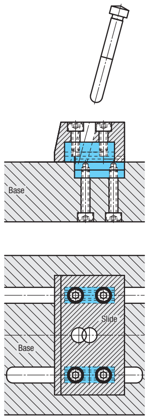
Example of a mounting groove



Bolt hole
Groove depth T $^{-0.01}_{-0.02}$
Slide
pitch±0.005
Groove width W $^{+0.01}_{0}$
Groove width W $^{+0.01}_{0}$
Groove depth T $^{-0.01}_{-0.02}$
pitch±0.005
Base or Cavity insert
Bolt hole

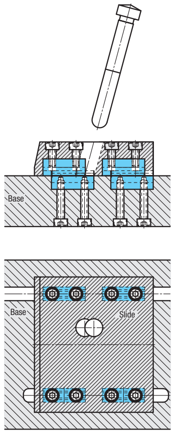
ex Example

With one rail (/row)



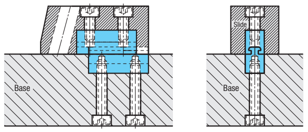
Base
Slide
Base

With multiple rails (/row)



Base
Base
Slide

Available as a center rail for a compact slide core.



Base
Slide
Base

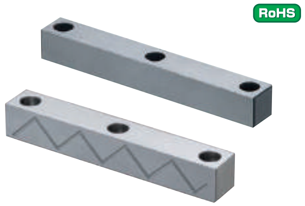
Notes on handling

- Be sure to apply grease to the sliding surface to prevent it from burning.
- If you are concerned about an impact when dovetail parts stroke and fit together, chamfer the face of dovetail parts more.

Guide Rails
Center Rails

CENTER RAILS

—STANDARD TYPE (NON-OIL GROOVE・OIL GROOVE)—

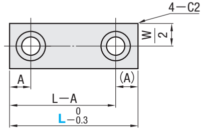

RoHS

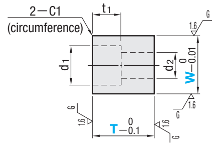
Part Number		M	H
Non-oil groove	Oil groove		
CGS	**CGSM**	SKS3	53～56HRC
CGM	—	HPM2T equivalent	37～41HRC

■Table for Bolt Hole Size

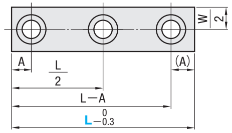
W	T	d_1	d_2	t_1
12	10	8	4.5	5
15	15	9.5	5.5	6
20	15・20	11	6.5	7

■Mounting bolt hole : 2

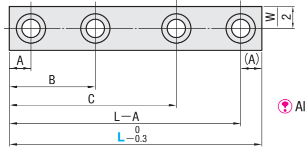




■Mounting bolt hole : 3



■Mounting bolt hole : 4



ⓘ All corners C≦1 unless specified.

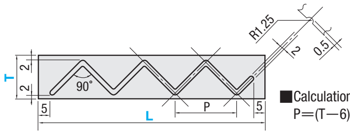
■Oil Groove Pitch

T	P
10	8
15	18
20	28

ⓘ Please note that if L≦P＋10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

ⓘ Oil grooves are machined on both sides.

■Details of Oil Groove (CGSM)



■Calculation method for oil groove pitch
P＝(T−6)×2

Part Number Type	W	T	L	No. of bolt holes	A	B	C
Non-oil groove **CGS** (SKS3) **CGM** (HPM2T equivalent) Oil groove **CGSM** (SKS3)	12	10	40	2	7.5	—	—
			50 60 70	3			
			80	4		30	50
			90			32.5	57.5
			100			35	65
	15	15	40 50 60	2		—	—
			70 80 90 100	3			
	20	15	50 60 70 80 90	2			
			100 110	3	10		
		20	120 130 140 150				

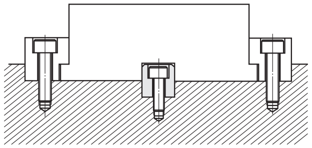
Order

Part Number	—	T	—	L
CGS12	—	10	—	40

Days to Ship **Quotation**

Price **Quotation**

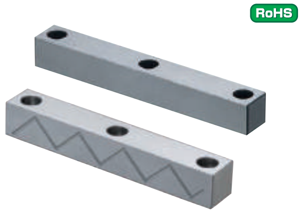
Example



CENTER RAILS

—L DIMENSION DESIGNATION TYPE (NON-OIL GROOVE・OIL GROOVE)—

ⓘ Non JIS material definition is listed on P.1351 - 1352

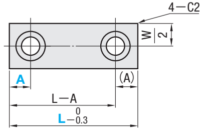

RoHS

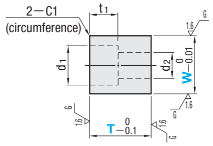
Part Number		M	H
Non-oil groove	Oil groove		
CGRS	**CGRSM**	SKS3	53～56HRC
CGRM	—	HPM2T equivalent	37～41HRC

■Table for Bolt Hole Size

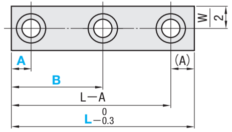
W	T	d_1	d_2	t_1
12	10・15	8	4.5	5
15	15・20	9.5	5.5	6
20	15・20	11	6.5	7
	25	14	9	9

■Mounting bolt hole : 2

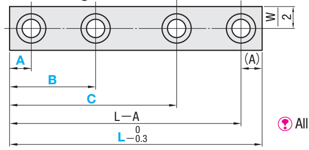




■Mounting bolt hole : 3



■Mounting bolt hole : 4



ⓘ All corners C≦1 unless specified.

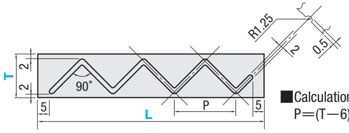
■Oil Groove Pitch

T	P
10	8
15	18
20	28
25	38

ⓘ Please note that if L≦P＋10, there is the possibility that 1 cycle (1 pitch) of oil groove can not be cut.

ⓘ Oil grooves are machined on both sides.

■Details of Oil Groove (CGRSM)



■Calculation method for oil groove pitch
P＝(T−6)×2

Part Number Type	W	T Selection	L 5mm increments	Bolt hole pitch 0.5mm increments A	B	C	No. of bolt holes
Non-oil groove **CGRS** (SKS3) **CGRM** (HPM2T equivalent) Oil groove **CGRSM** (SKS3)	12	10 15	40～ 55	6.0～14.0	—	—	2
			60～ 75	6.0～14.0	26.0～37.5		3
			80～ 95	6.0～19.0	31.0～49.0		
			100	6.0～19.0	31.0～44.0	56.0～69.0	4
	15	15 20	40～ 55	6.0～14.0	—	—	2
			60～ 75	6.0～14.0	26.0～37.5		3
			80～ 95	6.0～19.0	31.0～49.0		
			100	6.0～19.0	31.0～44.0	56.0～69.0	4
	20	15 20 25	40～ 55	8.0～12.0	—	—	2
			60～ 75	8.0～22.0			
			80～ 95	8.0～32.0			
			100～115	8.0～27.0	43.0～57.5		3
			120～135	8.0～32.0	48.0～72.0		
			140～150	8.0～42.0	68.0～92.0		

Order

Part Number	—	T	—	L	—	A−B−C
CGRS12	—	10	—	40	—	A6.0

Days to Ship **Quotation**

Price **Quotation**

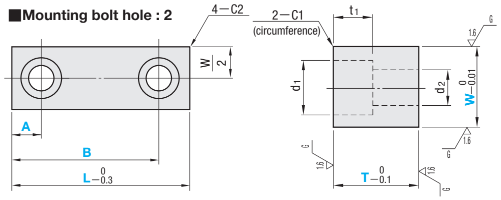
CENTER RAILS

—FREE DESIGNATION TYPE—

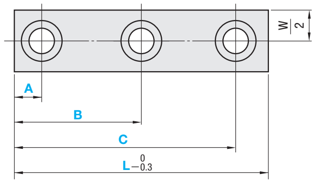
Non JIS material definition is listed on P.1351 - 1352

RoHS

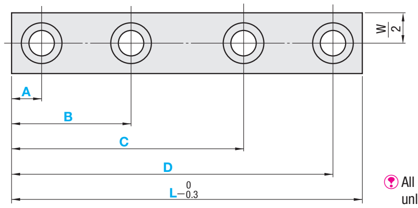
■Mounting bolt hole : 2



■Mounting bolt hole : 3



■Mounting bolt hole : 4



All corners C≦1 unless specified.

Part Number	M	H
FCGS2M · FCGS3M · FCGS4M	SKS3	53～56HRC
FCGM2M · FCGM3M · FCGM4M	HPM2T equivalent	37～41HRC

■Table for Bolt Hole Size

W	T	d_1	d_2	t_1
12	10～30	8	4.5	5
15	10～14	8	4.5	5
	15～40	9.5	5.5	6
20	15～24	11	6.5	7
	25～50	14	9	9

Part Number		T	L	Bolt hole pitch 0.5mm increments			
Type	W	1mm increments	5mm increments	A	B	C	D
FCGS2M(2 holes) FCGS3M(3 holes) FCGS4M(4 holes) (SKS3) FCGM2M (2 holes) FCGM3M (3 holes) FCGM4M (4 holes) (HPM2T equivalent)	12	10～30	40～100	6≦A≦B−10	A+10≦B≦C−10	B+10≦C≦D−10	C+10≦D≦L−6
	15	10～14	40～100	6≦A≦B−10	A+10≦B≦C−10	B+10≦C≦D−10	C+10≦D≦L−6
		15～40		7≦A≦B−11.5	A+11.5≦B≦C−11.5	B+11.5≦C≦D−11.5	C+11.5≦D≦L−7
	20	15～24	40～150	7.5≦A≦B−13	A+13≦B≦C−13	B+13≦C≦D−13	C+13≦D≦L−7.5
		25～50		9≦A≦B−16	A+16≦B≦C−16	B+16≦C≦D−16	C+16≦D≦L−9

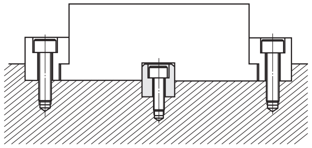
Order

Part Number	—	T	—	L	—	A	—	B	—	C	—	D
FCGS4M12	—	13	—	100	—	A13.0	—	B33.5	—	C54.5	—	D78.5

Days to Ship **Quotation**

Price **Quotation**

Example



OIL-FREE CENTER RAILS

—STANDARD TYPE (COPPER ALLOY)—

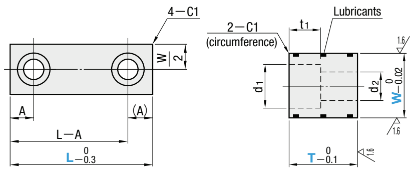
RoHS

Part Number	M
CGZ	Grade-4 high strength brass (CAC304) (Old JIS: HBsC4) Special solid lubricant embedded

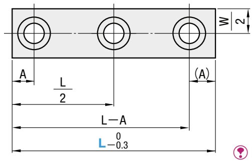
■Table for Bolt Hole Size

W	T	d1	d2	t1
15	15	9.5	5.5	6
20	15	11	6.5	7
	20			

■Mounting bolt hole : 2


4−C1
2−C1
(circumference)
Lubricants
t1
W/2
d1
d2
$W^{\ 0}_{-0.02}$
A
(A)
L−A
$L^{\ 0}_{-0.3}$
$T^{\ 0}_{-0.1}$
1.6

■Mounting bolt hole : 3


W/2
A
L/2
(A)
L−A
$L^{\ 0}_{-0.3}$

Keep temperature under 80℃ or lower.

Part Number		T	L	No. of bolt holes	A
Type	W				
CGZ	15	15	40 50 60	2	7.5
			70 80 90 100	3	
	20	15	40 50 60 70 80 90	2	10
			100 110	3	
		20	120 130 140 150		

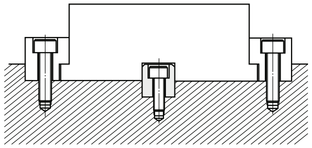
Order

Part Number	—	T	—	L
CGZ15	—	15	—	40

Days to Ship Quotation

Price Quotation

Example



OIL-FREE CENTER RAILS

—BOLT HOLE PITCH DESIGNATION TYPE (COPPER ALLOY)—

Non JIS material definition is listed on P.1351 - 1352

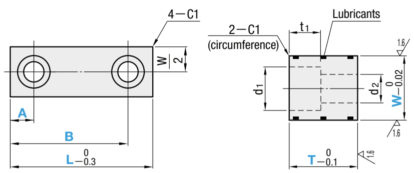
RoHS

Part Number	M
CGZF−□H	Grade-4 high strength brass (CAC304) (Old JIS: HBsC4) Special solid lubricant embedded

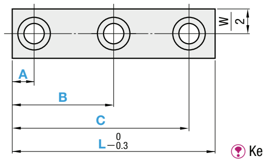
■Table for Bolt Hole Size

W	T	d1	d2	t1
15	15	9.5	5.5	6
20	15	11	6.5	7
	20			

■Mounting bolt hole : 2 2H


4−C1
2−C1
(circumference)
Lubricants
t1
W/2
d1
d2
$W^{\ 0}_{-0.02}$
A
B
$L^{\ 0}_{-0.3}$
$T^{\ 0}_{-0.1}$
1.6

■Mounting bolt hole : 3 3H



Keep temperature under 80℃ or lower.

Part Number			T	L	Bolt hole pitch 0.5mm increments					
Type	No. (Bolt hole)	W	Selection	10mm increments	A		B		C	
					min.	max.	min.	max.	min.	max.
CGZF	2H 3H	15	15	2H 40〜 70 3H 60〜100	7	B−11.5	A+11.5	2H L−7 3H C−11.5	B+11.5	3H L−7
		20	15	2H 40〜110 3H 80〜110	7.5	B−13	A+13	2H L−7.5 3H C−13	B+13	3H L−7.5
			20	3H 120〜150						

Order

	Part Number	—	T	—	L	—	A	—	B	—	C
2H	CGZF−2H15	—	15	—	70	—	A7	—	B47		
3H	CGZF−3H15	—	15	—	100	—	A7	—	B40	—	C90

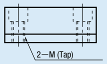
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	T	—	L	—	A	—	B	—	(MC)
CGZF−2H15	—	15	—	70	—	A13.0	—	B52.0	—	MC

Quotation

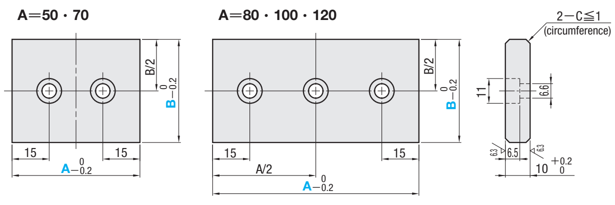
Alteration	Code	Spec.	1Code
 2−M (Tap)	MC	Change to tap hole Details P.684	Quotation

SLIDE ADJUSTMENT PLATES

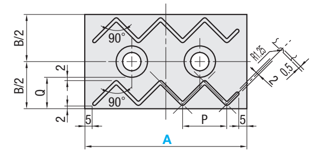
—STANDARD TYPE (NON-OIL GROOVE・OIL GROOVE・OIL-FREE COPPER ALLOY)—

Part Number		M	H
Non-oil groove	Oil groove		
SAS	**SASM**	SKS3	53～56HRC
SAP	**SAMM**	HPM2T equivalent	37～41HRC

RoHS


A=50・70
A=80・100・120
2−C≦1
(circumference)
B/2
B−0.2
15
15
A−0.2
A/2
11
6.6
6.3
6.5
10 +0.2

■Details of Oil Groove (SASM・SAMM)

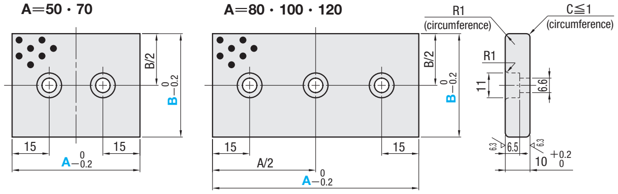

B/2
B/2
90°
90°
R1.25
0.5
2
Q
2
5
P
5
A

■Calculation method for oil groove pitch
P=(Q−6)×2

■Oil Groove Pitch

B	Q	P
30	9.5	7
40	14.5	17
50	19.5	27
60	24.5	37

Part Number	M
SAPZ	Grade-4 high strength brass (CAC304) (Old JIS : HBsC4) Special solid lubricant embedded


A=50・70
A=80・100・120
R1
(circumference)
C≦1
(circumference)
R1
B/2
B−0.2
15
15
A−0.2
A/2
11
6.6
6.3
6.5
10 +0.2

Keep temperature under 80℃ or lower.

Part Number		B	U/Price 1～9				
			Non-oil groove		Oil groove		Oil-free
Type	A		SAS	SAP	SASM	SAMM	SAPZ
Non-oil groove **SAS** (SKS3) **SAP** (HPM2T equivalent) Oil groove **SASM** (SKS3) **SAMM** (HPM2T equivalent) Oil-free **SAPZ** (Sizes with ※ mark are applicable to SAP only.)	50	30					
		40					
		50※	—		—	—	—
	70	30					
		40					
		50					
		60※	—		—	—	—
	80	30					
		40					
		50			Quotation		
		60					
		70※	—		—	—	—
	100	40					
		50					
		60					
		70※	—		—	—	—
	120	40					
		50					
		60					
		70※	—		—	—	—

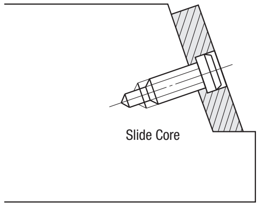
Order Part Number — B
SAP70 — 40

Days to Ship Quotation

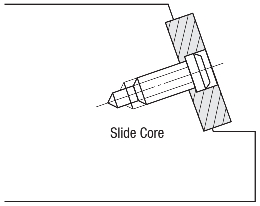
Price Quotation

ex Example

(1) Bolt fixing



(2) Embedded



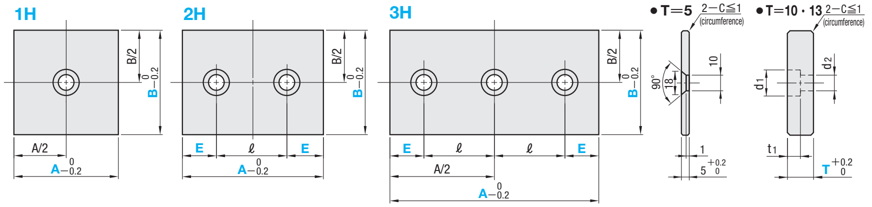
SLIDE ADJUSTMENT PLATES

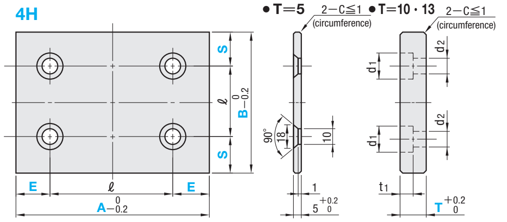
—FREE DESIGNATION TYPE (NON-OIL GROOVE・OIL GROOVE)—

Non JIS material definition is listed on P.1351 - 1352

Part Number		M	H
Non-oil groove	Oil groove		
SAPS□H	**SAPSM□H**	SKS3	53～56HRC
SAPM□H	**SAPMM□H**	HPM2T equivalent	37～41HRC

RoHS


1H
2H
3H
B/2
B−0.2
A/2
A−0.2
E
ℓ
E
ℓ
ℓ
●T=5
2−C≦1
(circumference)
●T=10・13
2−C≦1
(circumference)
90°
18
10
1
5 +0.2
t1
d1
d2
T +0.2

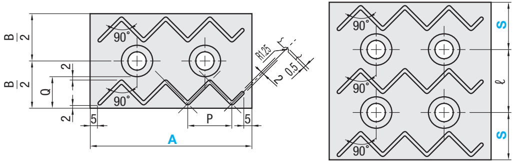

4H
●T=5
2−C≦1
(circumference)
●T=10・13
2−C≦1
(circumference)
S
ℓ
S
B−0.2
E
ℓ
E
A−0.2
90°
18
10
1
5 +0.2
t1
T +0.2
d1
d2

■Table for Bolt Hole Size

T	Bolt	d_1	d_2	t_1
5	Countersunk bolt M8−20	—	—	—
10	M6	11	6.5	7
13	M8	14	9	9

When using T=5 and a hexagonal socket head countersunk, take steps to prevent the bolt from coming loose.

■Details of Oil Groove (SAPSM□H・SAPMM□H)


B/2
B/2
90°
90°
R1.25
0.5
2
Q
2
5
P
5
A
90°
90°
90°
90°
S
ℓ
S

■Calculation method for oil groove pitch

・1H～3H
Machining limit
Q≧9.5
Oil groove pitch (P)
P=(Q−6)×2

・4H

Bolt	Machining limit	Oil groove pitch (P)
M8−20 (Flat head bolt)	S≧19 & ℓ≧28	P=(S−d_1/2−6)×2 & P=(R−d_1−6)×2
M6	S≧15 & ℓ≧21	
M8	S≧17 & ℓ≧24	

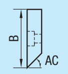
Part Number		5mm increments			T	E・S 1mm increments	ℓ	U/Price 1～9			
			B					Non-oil groove		Oil groove	
Type	No.	A	Non-oil groove	Oil groove				SAPS	SAPM	SAPSM	SAPMM
Non-oil groove **SAPS** (SKS3) **SAPM** (HPM2T equivalent) Oil groove **SAPSM** (SKS3) **SAPMM** (HPM2T equivalent)	1H	30～ 40	30～40	40～50	5	$E>\frac{d_1}{2}+2$ Non-oil groove $S>\frac{d_1}{2}+2$ Oil groove $S\geqq\frac{d_1}{2}+9.5$	Non-oil groove ℓ>d_1+2 Oil groove ℓ>d_1+10				
				35～50	10						
	2H	50～ 70	30～50	40～50	5						
				35～50	10						
	3H	80～120	30～60	40～60	5				Quotation		
				35～60	10						
	4H	130～150	50～80	70～80	5						
				55～80	10						
				60～80	13						

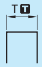
Order Part Number — A — B — T — E — S
SAPM2H — A70 — B50 — T10 — E15

Days to Ship Quotation

Price Quotation

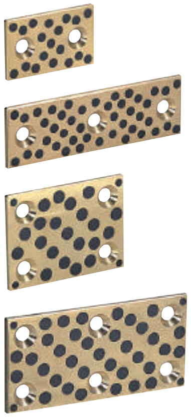
Alterations Part Number — A — B — T — E — S — (AC・TKC)
SAPM2H — A70 — B50 — T10 — E15 — AC15

Alteration	Code	Spec.	1Code
	AC	Adds an inclined plane. AC=1° increments 0<AC≦35 AC30°···› AC30	Quotation

Alteration	Code	Spec.	1Code
	TKC	Changes T dimension tolerance. $T^{+0.2}_{0}$ ⇨ $T^{+0.02}_{0}$	Quotation

OIL-FREE THIN SLIDE PLATES

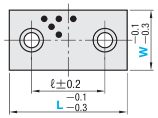
—COPPER ALLOY 5mm TYPE—



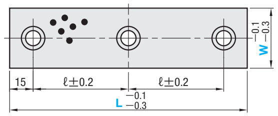
RoHS

UTW

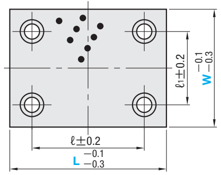
- 2-hole type


ℓ±0.2
L −0.1 −0.3
W −0.1 −0.3

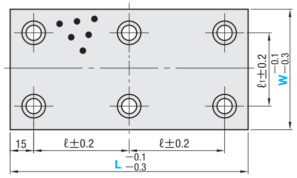
- 3-hole type

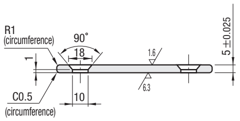

15
ℓ±0.2
ℓ±0.2
L −0.1 −0.3
W −0.1 −0.3

- 4-hole type

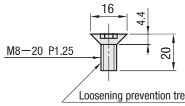

ℓ±0.2
L −0.1 −0.3
ℓ1±0.2
W −0.1 −0.3

- 6-hole type


15
ℓ±0.2
ℓ±0.2
L −0.1 −0.3
ℓ1±0.2
W −0.1 −0.3


R1
(circumference)
90°
18
1
1.6
6.3
C0.5
(circumference)
10
5±0.025

- **Installation bolt**


16
4.4
M8−20 P1.25
20
Loosening prevention treatment

- Sliding direction

<What is Loosening Prevention Treatment?>
This treatment applies on the screw threads with a special plastic that excels in elasticity as well as abrasion and oil resistance.
Its effect will gradually decreases from the 2nd use.

Keep temperature under 80℃ or lower.

M Copper alloy
Special solid lubricant embedded
A Flat Head Cap Screws

Bolt Hole Type	ℓ	ℓ1	Part Number	W	L	U/Price
						1〜19
2 holes	20	—	UTW	28	50	Quotation
	45				75	
	70				100	
3 holes	60				150	
2 holes	20	—		38	50	
	45				75	
	70				100	
3 holes	60				150	
2 holes	45	—		48	75	
	70				100	
	95				125	
3 holes	60				150	
4 holes	45	45		75	75	
	70				100	
	95				125	
6 holes	60				150	
4 holes	70	70		100	100	
	95				125	
6 holes	60				150	

Order

Part Number	W	—	L
UTW	75	—	100

Prior to use, apply initial running-in grease for better performance.

Days to Ship **Quotation**

Price **Quotation**

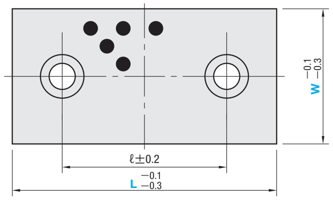
OIL-FREE SLIDE PLATE

—SKS3 (53〜56HRC) 5mm TYPE—

Non JIS material definition is listed on P.1351 - 1352

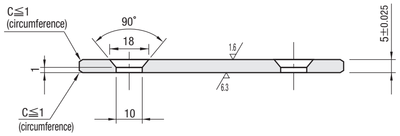
RoHS

UTWSZ

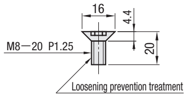

ℓ±0.2
L −0.1 −0.3
W −0.1 −0.3

- Sliding direction

For W=28, 38,
longitudinal (L) direction only.


C≦1
(circumference)
90°
18
1
1.6
6.3
C≦1
(circumference)
10
5±0.025

- **Installation bolt**


16
4.4
M8−20 P1.25
20
Loosening prevention treatment

<What is Loosening Prevention Treatment?>
This treatment applies on the screw threads with a special plastic that excels in elasticity as well as abrasion and oil resistance.
Its effect will gradually decreases from the 2nd use.

Keep temperature under 80℃ or lower.

M SKS3
Special solid lubricant embedded
H 53〜56HRC
A Flat Head Cap Screws

ℓ	Part Number	W	L	U/Price
				1〜19
20	UTWSZ	28	50	Quotation
45			75	
70			100	
20		38	50	
45			75	
70			100	
45		48	75	
70			100	

Order

Part Number	W	—	L
UTWSZ	38	—	100

Price **Quotation**

Days to Ship **Quotation**

Prior to use, apply initial running-in grease for better performance.

OIL-FREE SLIDE PLATES

—COPPER ALLOY 10mm • 2-BOLT TYPE/4-BOLT TYPE—

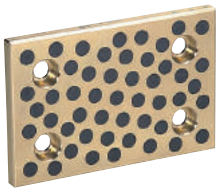
2-bolt type RoHS

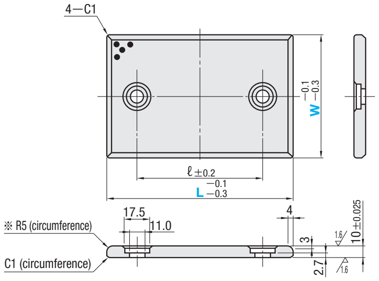
STW W= 28～ 75

STWT W=100～150

4-bolt type RoHS

STW W=100～150





4—C1
−0.1
−0.3
W
ℓ±0.2
−0.1
L −0.3
17.5
11.0
4
※ R5 (circumference)
C1 (circumference)
3
2.7
1.6
1.6
10±0.025

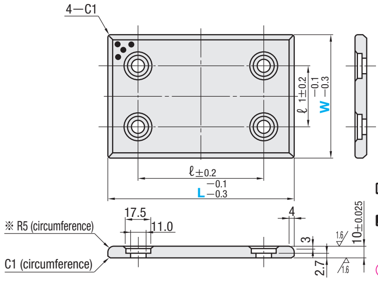
- Sliding direction

✥

For W=28, 38, longitudinal (L) direction only.

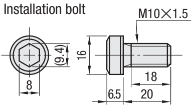
- Prior to use, apply initial running-in grease for better performance.

※For W=28, 38, R in the longitudinal direction is R2 instead of R5.



4—C1
ℓ 1±0.2
−0.1
−0.3
W
ℓ±0.2
−0.1
L −0.3
17.5
11.0
4
※ R5 (circumference)
C1 (circumference)
3
2.7
1.6
1.6
10±0.025

- Installation bolt



M10×1.5
(9.4)
16
8
18
6.5
20

M Copper alloy
Special solid lubricant embedded
A Special low head bolts
M10—20

Keep temperature under 80℃ or lower.

ℓ	Part Number	W	L	U/Price
				1～19
45	2-bolt type**STW**	28	75	Quotation
50			100	
75			125	
100			150	
45		38	75	
50			100	
75			125	
100			150	
45		48	75	
50			100	
75			125	
100			150	
150			200	
45		58	75	
50			100	
100			150	
※ 25		75	75	
50			100	
75			125	
100			150	
150			200	
50	2-bolt type**STWT**	100	100	
75			125	
100			150	
150			200	
200			250	
100		125	150	
150			200	
200			250	
100		150	150	
150			200	

※ ℓ dimension of STW75—75 is 25.
Pitch (ℓ) between bolts is determined which is widely taken in press dies for cars.

ℓ	ℓ1	Part Number	W	L	U/Price
					1～19
50	50	4-bolt type **STW**	100	100	Quotation
75				125	
100				150	
150				200	
200				250	
100	50		125	150	
150				200	
200				250	
100	100		150	150	
150				200	

Order

Part Number	W	—	L
STW	75	—	100
STWT	100	—	200

Days to Ship Quotation

Price Quotation

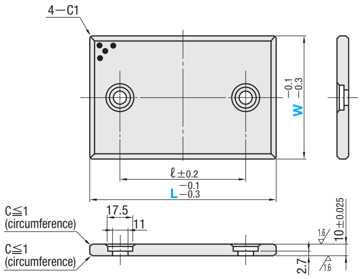
■Shims for Oil-free Slide Plate SMP ☞ P.730

OIL-FREE SLIDE PLATES／COMPACT OIL-FREE SLIDE PLATES

—SKS3 (53～56HRC) 10mm TYPE— —COPPER ALLOY 10mm TYPE—

Non JIS material definition is listed on P.1351 - 1352

STWSZ RoHS



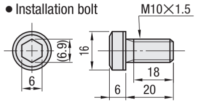
4—C1
−0.1
−0.3
W
ℓ±0.2
−0.1
L −0.3
C≦1 (circumference)
C≦1 (circumference)
17.5
11
2.7
1.6
1.6
10±0.025

- Sliding direction

✥

For W=28, 38, longitudinal (L) direction only.

- Installation bolt



M10×1.5
(6.9)
16
6
18
6
20

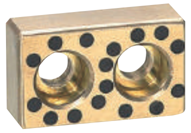
M SKS3
Special solid lubricant embedded
H 53～56HRC
A Low head bolts
M10—20

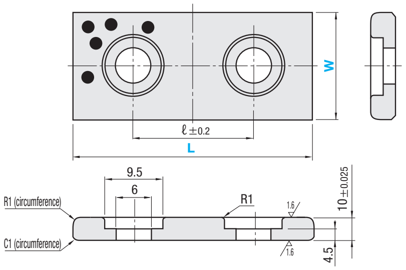
- Prior to use, apply initial running-in grease for better performance.

Keep temperature under 80℃ or lower.

ℓ	Part Number	W	L	U/Price
				1～19
45	**STWSZ**	28	75	Quotation
50			100	
100			150	
45		38	75	
50			100	
45		48	75	
50			100	
100			150	
45		58	75	
50			100	
100			150	

STS RoHS



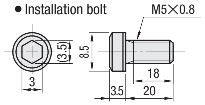


W
ℓ±0.2
L
9.5
6
R1 (circumference)
C1 (circumference)
R1
1.6
1.6
10±0.025
4.5

- Sliding direction

✥

- Installation bolt



M5×0.8
(3.5)
8.5
3
18
3.5
20

M Grade-4 high strength brass (CAC304)
(Old JIS : HBsC4)
Special solid lubricant embedded
A Low head bolts
M5×20

- Prior to use, apply initial running-in grease for better performance.

Keep temperature under 80℃ or lower.

ℓ	Part Number	W	L	U/Price
				1～19
14	**STS**	15	30	Quotation
20			40	
30			50	
50			75	
14		18	30	
20			40	
30			50	
50			75	
14		22	30	
20			40	
30			50	
50			75	

Order

Part Number	W	—	L
STWSZ	38	—	100
STS	18	—	50

Price Quotation

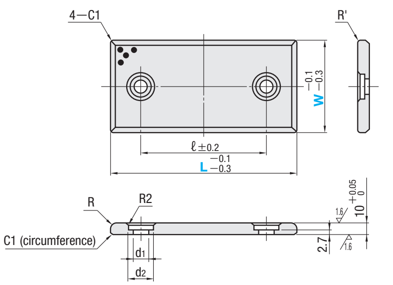
Days to Ship Quotation

OIL-FREE SLIDE PLATES

—COPPER ALLOY 10mm • PLATE THICKNESS PLUS TOLERANCE TYPE—

RoHS

PSLP



- Sliding direction

For W=30 • 40, longitudinal (L) direction only.

- Prior to use, apply initial running-in grease for better performance.

- **Recommended installation bolts**

W	L	Recommended installation bolts
30	50	CBS8—20 (Low Head Cap Screw)
40	50	
30	75~150	CBS10—20 (Low Head Cap Screw)
40	75~150	
50	75~150	

M Grade-4 high strength brass (CAC304)
(Old JIS : HBsC4
Special solid lubricant embedded

R	R'	d_1	d_2	ℓ	No. of holes	Part Number	W	L	U/Price 1~9
R2	R2	9	14.5	20	2	PSLP	30	50	Quotation
R4		11	17.5	45				75	
				50				100	
				75				125	
				100				150	
R2		9	14.5	20			40	50	
R4		11	17.5	45				75	
				50				100	
				75				125	
				100				150	
	R4			45			50	75	
				50				100	
				75				125	
				100				150	

Order

Part Number	W	—	L
PSLP	40	—	100

Days to Ship Quotation

Price Quotation

■Features : It is different from conventional slide plates, and adjustment becomes easier due to plus thickness.

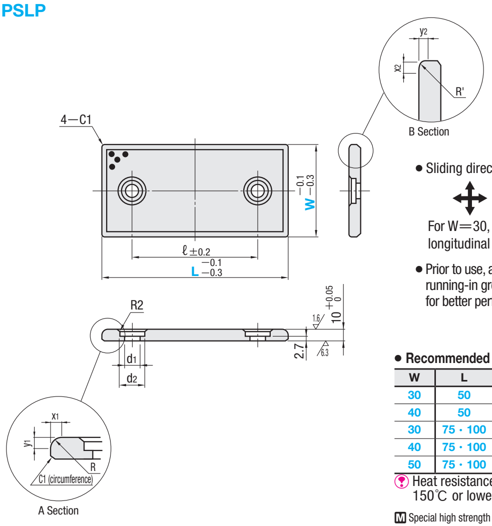
OIL-FREE SLIDE PLATES

—COPPER ALLOY 10mm • HEAT RESISTANT 150℃ TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

HPSLP



- Sliding direction

For W=30, W=40 • L=50, longitudinal direction (L) only.

- Prior to use, apply initial running-in grease for better performance.

- **Recommended installation bolts**

W	L	Recommended installation bolts
30	50	CBS8—20 (Low Head Cap Screw)
40	50	
30	75 · 100	CBS10—20 (Low Head Cap Screw)
40	75 · 100	
50	75 · 100	

Heat resistance temperature : 150℃ or lower

M Special high strength brass Special solid lubricant embedded

A Section			B Section			d_1	d_2	ℓ	No. of holes	Part Number	W	L	U/Price
R	x_1	y_1	R'	x_2	y_2								1~9
R3	3	3	R3	3	3	9	14.5	20	2	HPSLP	30	50	Quotation
R5	4	3	R2	2	2	11	17.5	45				75	
								50				100	
R3	3	3	R3	3	3	9	14.5	20			40	50	
R5	4	3	R5	4	3	11	17.5	45				75	
								50				100	
								45			50	75	
								50				100	

Order

Part Number	W	—	L
HPSLP	30	—	100

Days to Ship Quotation

Price Quotation

■Features : It can be used under high temperature conditions as compared to conventional slide plates.

OIL-FREE SLIDE PLATES

—COPPER ALLOY 20mm・2-BOLT TYPE/4-BOLT TYPE—

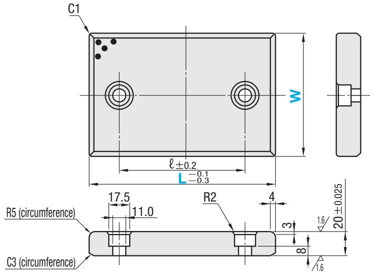
2-bolt type RoHS

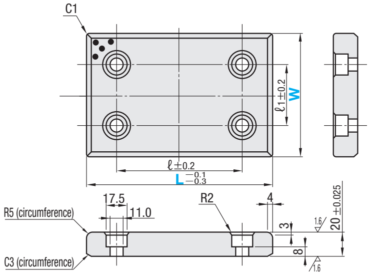
SEW W= 28～ 75

SEWT W=100～150

4-bolt type RoHS

SEW W=100～150


C1
W
ℓ±0.2
L $^{-0.1}_{-0.3}$
17.5
11.0
R2
4
R5 (circumference)
C3 (circumference)
3
8
1.6
20±0.025


C1
ℓ1±0.2
W
ℓ±0.2
L $^{-0.1}_{-0.3}$
17.5
11.0
R2
4
R5 (circumference)
C3 (circumference)
3
8
1.6
20±0.025

※For W=28, 38, R in the longitudinal direction is R2 instead of R5.

- Sliding direction

✥

For W=28, 38, longitudinal (L) direction only.

- Prior to use, apply initial running-in grease for better performance.

Keep temperature under 80℃ or lower.

M Copper alloy
Special solid lubricant embedded

ℓ	Part Number	W	L	U/Price 1～19
45	2-bolt type **SEW**	28	75	Quotation
50			100	
100			150	
45		38	75	
50			100	
100			150	
45		48	75	
50			100	
75			125	
100			150	
150			200	
45		58	75	
50			100	
100			150	
25		75	75	
50			100	
75			125	
100			150	
150			200	
50	2-bolt type **SEWT**	100	100	
75			125	
100			150	
150			200	
200			250	
200			300	
75		125	125	
100			150	
150			200	
200			250	
200			300	
200			350	
100		150	150	
150			200	
200			250	

■ **Shims for Oil-free Slide Plate・SMP** ☞ **Right page**

ℓ	ℓ1	Part Number	W	L	U/Price 1～19
50	50	4-bolt type **SEW**	100	100	Quotation
75				125	
100				150	
150				200	
200				250	
200				300	
75	50		125	125	
100				150	
150				200	
200				250	
200				300	
200				350	
100	100		150	150	
150				200	
200				250	

Order

Part Number	W	—	L
SEW	75	—	125
SEWT	150	—	200

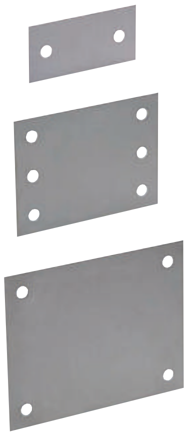
Days to Ship Quotation

Price Quotation

SHIMS FOR OIL-FREE SLIDE PLATES

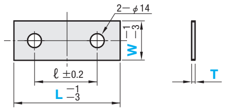
Non JIS material definition is listed on P.1351 - 1352

RoHS

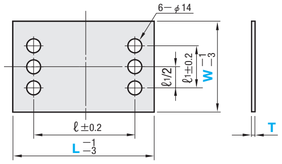


SMP

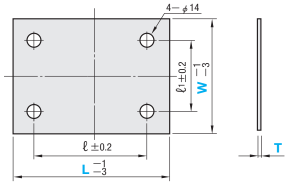
W=28～75
(For 2 holes)


2−ϕ14
W $^{-1}_{-3}$
ℓ±0.2
L $^{-1}_{-3}$
T

W=100～150
(For 2・4 holes)


6−ϕ14
ℓ1/2
ℓ1±0.2
W $^{-1}_{-3}$
ℓ±0.2
L $^{-1}_{-3}$
T

W=200
(For 4 holes)


4−ϕ14
ℓ1±0.2
W $^{-1}_{-3}$
ℓ±0.2
L $^{-1}_{-3}$
T

T	T T
0.05	± 0.01
0.1	± 0.02

M SUS304

ℓ	ℓ1	Part Number	W	L	T	U/Price 1～19
45	—	**SMP**	28	75	0.05 0.1	Quotation
50				100		
75				125		
100				150		
150				200		
45			38	75		
50				100		
75				125		
100				150		
150				200		
45			48	75		
50				100		
75				125		
100				150		
150				200		
45			58	75		
50				100		
100				150		
25			75	75		
50				100		
75				125		
100				150		
150				200		

ℓ	ℓ1	Part Number	W	L	T	U/Price 1～19
50	50	**SMP**	100	100	0.05 0.1	Quotation
75				125		
100				150		
150				200		
200				250		
200				300		
75	50		125	125		
100				150		
150				200		
200				250		
200				300		
200				350		
100	100		150	150		
150				200		
200				250		
250				300		
150	150		200	200		
200				250		
250				300		

Order

Part Number	W	—	L	—	T
SMP	75	—	100	—	0.1

Days to Ship Quotation

Price Quotation

■**Applicable Oil-free Slide Plates**
- **STW・STWT** ☞ **P.725**
- **SEW・SEWT** ☞ **Left page**

SPRUE BUSHINGS · LOCATING RINGS

SPRUE BUSHINGS LOCATING RINGS

Product Name	Ecology/Sprue Bushings Normal Bolt Type—Flange thickness 10mm · Straight—		—Flange thickness 10mm · Tapered—		Ecology/Sprue Bushings Shoulder Type—Straight—		—Tapered—	
Part Number	SBBPE	SBBKE	SBGPE	SBGKE	SBSME	SBSDE	SBTME	SBTDE
Page	743	743	743	743	745	745	745	745

Sprue Bushings Normal Bolt Type—Flange thickness 10mm · Straight · L dimension selection—		—Flange thickness 10mm · Straight—		—Flange thickness 10mm · Tapered—		String Eliminator Sprue Bushings—Board Thickness Selection Type—
SBB□—B	SBB□H—B	SBB□	SBB□H	SBG□	SBG□H	SBBJH SBBYH
749	749	751	751	751	751	753

Sprue Bushings Bolt Fixing Type—(Old) JIS A/Straight—			Sprue Bushings Bolt Fixing Type—(Old) JIS A/Tapered—			Sprue Bushings Proper Bolt Type—Flange thickness 10mm · Straight—			—Flange thickness 10mm · Tapered—		
SJA□	SJA□E	SJA□H	SJG□	SJG□E	SJG□H	SBB□	SBB□E	SBB□H	SBG□	SBG□E	SBG□H
755	755	755	755	755	755	757	757	757	757	757	757

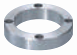
Cooling Sprue Bushings		Sprue Bushings Normal Bolt Type—Flange thickness 15mm · Straight—		—Flange thickness 15mm · Tapered—		—Flange thickness 20mm · Straight—		—Flange thickness 20mm · Tapered—	
SBC□	SBC□H	SBB□	SBB□H	SBG□	SBG□H	SBB□	SBB□H	SBG□	SBG□H
759	759	761	761	761	761	763	763	763	763

Sprue Bushings Normal Bolt Type—Flange thickness 8mm · Straight—		—Flange thickness 8mm · Tapered—		Sprue Bushings Shoulder Type—Straight—		—Tapered—	
SBB□S	SBB□	SBB□TS	SBB□T	SBS□	SBS□H	SBT□	SBT□H
765	765	765	765	767	767	767	767

Sprue Bushings Shoulder Type —(Old) JIS B/Straight—		—(Old) JIS B Type/Tapered—		Sprue Bushings Normal Bolt Type—Electroforming/Flange thickness 10mm—		—Electroforming/Flange thickness 15mm—	
SJB□	SJB□H	SJT□	SJT□H	SBBN	SBBNT	SBBE	SBBET
769	769	769	769	773	773	775	775

Sprue Bushings—Electroforming/(Old) JIS A—		Sprue Bushings Shoulder Type—Electroforming—		—Electroforming/(Old) JIS B sprue—		Thread Prevent Caps	Sprue bushing sets for extension nozzle—locator presser type—
SBJE	SBJET	SBSN	SBSNT	SBJN	SBJNT	M-SK	SXHM SXHD
777	777	779	779	781	781	783	784

Sprue Bushings for Extension Nozzle—Straight—	—Tapered—	Sprue Bushing Guides	Sprue Lock Bushings —B dimension designation, B dimension selection Head type/Straight—		
SX□ SXD□ SXC□	SXT□ SXG□ SXS□	SBGN	SLBF	SLBH	SLBS
785	785	787	789	789	789



Locating Rings—Bolt type (2 holes)—	—Bolt type (4 holes)—	—Bolt type—	—JIS type—	—Runner lock pin pressing type—	Locating Rings —Large diameter type—
LRBS	LRBF	LRBD	LRJS	LRJST	LRK
791	791	791	791	791	791

Locating Rings—Reversible type—	—Shoulder type—	—Shoulder type—	Locating Ring Adapter	Locating Rings Packed	
LRBW	LRSS	LRSD	LAR	10 · 20PACK—LRBS	10 · 20PACK—LRSS
792	792	792	792	794	794

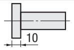
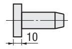
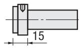
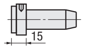
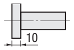
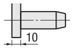
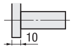
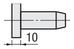
GUIDE FOR SPRUE BUSHINGS AND LOCATING RINGS①

Non JIS material definition is listed on P.1351 - 1352

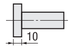
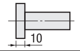
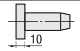
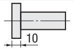
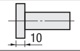
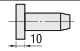
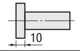
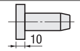
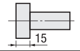
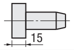
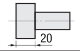
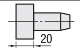
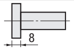
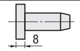
■List for Sprue Bushings

(Ecology Sprue Bushings)

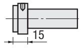
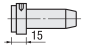
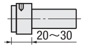
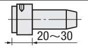
Ecology Sprue Bushings — Guide — P.739
Ecology Sprue Bushings — Examination results — P.741

Category	Type	Material Type	S45C	HPM1 equivalent	SKD61	DC53	Page
Normal bolt type (Flange thickness : 10mm)	 10	Straight	—	SBBPE	SBBKE	—	P.743
	 10	Tapered	—	SBGPE	SBGKE	—	
Shoulder type	 15	Straight	—	SBSME	SBSDE	—	P.745
	 15	Tapered	—	SBTME	SBTDE	—	
Normal bolt (Flange thickness : 10mm) Old JIS A type	 10	Straight	SJACE	SJAME	SJADE	—	P.755
	 10	Tapered	SJGCE	SJGME	SJGDE	—	
Proper bolt type (Flange thickness : 10mm)	 10	Straight	—	SBBME	SBBDE	—	P.757
	 10	Tapered	—	SBGME	SBGDE	—	

(Bolt type)

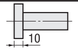
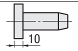
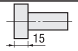
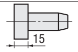
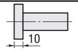
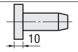
Category	Type	Material	S45C		HPM1 equivalent		SKD61		DC53		Page
		Type	Normal	String eliminator type	Normal	String eliminator type	Normal	String eliminator type	Normal	String eliminator type	
Normal bolt (Flange thickness : 10mm) (P3.5, SR11)	 10	Straight	—	—	SBBP—B	SBBPH—B	SBBK—B	SBBKH—B	SBBS—B	SBBSH—B	P.749
Normal bolt type (Flange thickness : 10mm)	 10	Straight	—	—	SBBP	SBBPH	SBBK	SBBKH	SBBS	SBBSH	P.751
	 10	Tapered	—	—	SBGP	SBGPH	SBGK	SBGKH	SBGS	SBGSH	
Normal bolt (Flange thickness : 10mm) (Board thickness selection)	 10	Straight	—	—	—	SBBJH	—	SBBYH	—	—	P.753
Normal bolt (Flange thickness : 10mm) Old JIS A type	 10	Straight	SJAC	SJACH	SJAM	SJAMH	SJAD	SJADH	—	—	P.755
	 10	Tapered	SJGC	SJGCH	SJGM	SJGMH	SJGD	SJGDH	—	—	
Proper bolt type (Flange thickness : 10mm)	 10	Straight	—	—	SBBM	SBBMH	SBBD	SBBDH	—	—	P.757
	 10	Tapered	—	—	SBGM	SBGMH	SBGD	SBGDH	—	—	
Normal bolt type (Flange thickness : 15mm)	 15	Straight	—	—	SBBH	SBBHH	SBBT	SBBTH	SBBX	SBBXH	P.761
	 15	Tapered	—	—	SBGH	SBGHH	SBGT	SBGTH	SBGX	SBGXH	
Normal bolt type (Flange thickness : 20mm)	 20	Straight	SBBF	SBBFH	SBBR	SBBRH	—	—	—	—	P.763
	 20	Tapered	SBGF	SBGFH	SBGR	SBGRH	—	—	—	—	
Normal bolt type (Flange thickness : 8mm)	 8	Straight	—	—	SBBZ SBBZS	—	SBBV SBBVS	—	—	—	P.765
	 8	Tapered	—	—	SBBZT SBBZTS	—	SBBVT SBBVTS	—	—	—	

(Shoulder type)

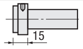
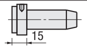
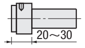
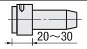
Category	Type	Material	S45C		HPM1 equivalent		SKD61		DC53		Page
		Type	Normal	String eliminator type	Normal	String eliminator type	Normal	String eliminator type	Normal	String eliminator type	
Shoulder type	 15	Straight	—	—	SBSM	SBSMH	SBSD	SBSDH	SBSS	SBSSH	P.767
	 15	Tapered	—	—	SBTM	SBTMH	SBTD	SBTDH	SBTS	SBTSH	
Old JIS B type	 20~30	Straight	SJBC	SJBCH	SJBM	SJBMH	SJBD	SJBDH	—	—	P.769
	 20~30	Tapered	SJTC	SJTCH	SJTM	SJTMH	SJTD	SJTDH	—	—	

(Electroforming Sprue Bushings/Normal bolt Type)

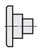
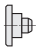
Guide P.889

Category	Type	Type	Part Number	Page
Normal bolt type (Flange thickness : 10mm)	 10	Straight	SBBN	P.773
	 10	Tapered	SBBNT	
Normal bolt type (Flange thickness : 15mm)	 15	Straight	SBBE	P.775
	 15	Tapered	SBBET	
Old JIS A type	 10	Straight	SBJE	P.777
	 10	Tapered	SBJET	

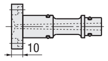
(Electroforming Sprue Bushings/Shoulder Type)

Category	Type	Type	Part Number	Page
Shoulder type	 15	Straight	SBSN	P.779
	 15	Tapered	SBSNT	
Old JIS B type	 20~30	Straight	SBJN	P.781
	 20~30	Tapered	SBJNT	

(Extension nozzle type)

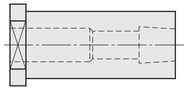
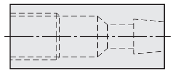
Category	Type	Material	HPM1 equivalent	SKD61	Page
		Type	Normal	Normal	
Locator Presser type		Tapered	SXHM	SXHD	P.784
Small nozzle type	 	Straight	SXM	SXD	P.785
		Tapered	SXTM	SXTD	
Large nozzle type		Straight	SXDM	SXDD	
		Tapered	SXGM	SXGD	
Special nozzle type		Straight	SXCM	SXCD	
		Tapered	SXSM	SXSD	

(Cooling Sprue Bushings)

Category	Type	Material	SUS420J2 equivalent	SKD61	Page
		Type			
Normal bolt type (Flange thickness : 10mm)	 10	Normal	SBCK SBCS	SBCD	P.759
		String eliminator type	SBCKH SBCSH	SBCDH	

GUIDE FOR SPRUE BUSHINGS AND LOCATING RINGS②

■List for Sprue Lock Bushings

Type	Material Type	SKD61 B selection type	 B designation type	Page
	Head type	**SLBH**	**SLBF**	P.789
	Straight type	**SLBS**	—	

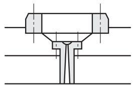
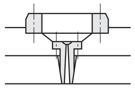
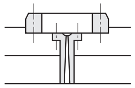
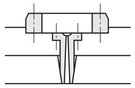
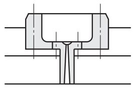
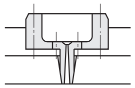
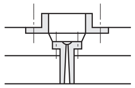
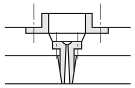
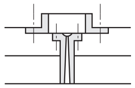
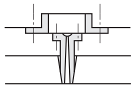
■List for Locating Rings

Category / Appl. sprue bushings	Material S45C Standard type	 Large diameter type	 JIS type	 Runner lock pin pressing type	 Reversible type	 Locating ring adapter
For bolt type	**LRBS** **LRBF** **LRBD** (P.791)	**LRK** (P.791)	**LRJS** (P.791)	**LRJST** (P.791)	**LRBW** (P.792)	**LAR** (P.792)
For shoulder type	**LRSS** **LRSD** (P.792)	—			—	

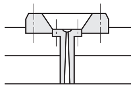
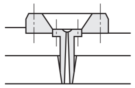
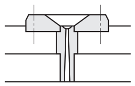
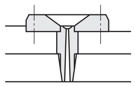
■Materials of Locating Ring and Sprue Bushings

M	H	Remarks
S45C	(Unannealed steel)	—
HPM1 equivalent	37～43HRC	Prehardened steel by aging
SKD61	48～52HRC	Quench-and-temper Tempering : 550℃ or higher
DC53	58～62HRC	Quench-and-temper Tempering : 200℃ or higher
Nickel alloy (Electro forming)	(Inside : 0.5mm) 55～60HRC (Outside) 38～42HRC	Details (P.772)

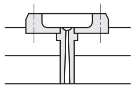
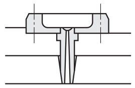
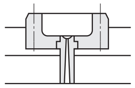
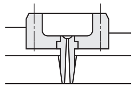
■Example of Combination (Normal Bolt stopper type)

Part Number		For two-plate mold	For three-plate mold
Locating ring Sprue Bushings	**LRBS** **LRBF** **SBB□** **SBG□**		
Locating ring Sprue Bushings	**LRBS** **LRBF** **SBB□** **SBG□**		
Locating ring Sprue Bushings	**LRBD** **SBB□** **SBG□**		
Locating ring Sprue Bushings	**LRK** **SBB□** **SBG□**		
Locating ring Sprue Bushings	**LRK** **SBB□** **SBG□**		

■Example of Combination (Old JIS Type)

Part Number		For two-plate mold	For three-plate mold
Locating ring Sprue Bushings	**LRJS** **SJA□** **SJG□**		
Locating ring Sprue Bushings	**LRJS** **SJB□** **SJT□**		

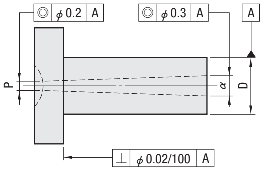
■Example of Combination (Shoulder Type)

Part Number		For two-plate mold	For three-plate mold
Locating ring Sprue Bushings	**LRSS** **SBS□** **SBT□**		
Locating ring Sprue Bushings	**LRSD** **SBS□** **SBT□**		

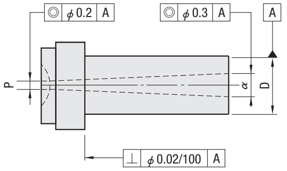
Non JIS material definition is listed on P.1351 - 1352

■About Sprue Bushings

●Concentricity・Squareness



※For electroforming, 0.05/100

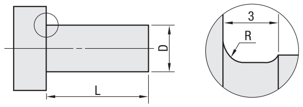


※For electroforming, 0.05/100

End and side faces of sprue bushings made of SKD61 or DC53 may be colored by heat treatment at the time of refining.

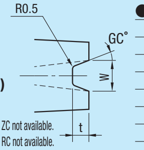
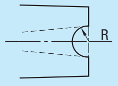
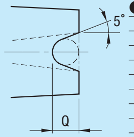
●About the head of sprue bushings

Relief processed in the flange neck part of sprue bushing (3mm range).
Because R is larger than the relief depth, do chamfering to installation holes.
(Refer to each page for details, please.)

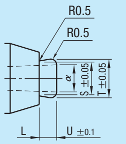


ALTERATION GUIDE FOR SPRUE BUSHING

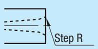
■Runner Groove Machining

Items	Specifications						1 Code
	Select the runner groove shape, groove dimension and groove type.						
	Runner groove shape	Groove dimension	Codes	Type	Codes	Type	
Runner groove machining	**Shape A (Trapezoid)**  ⊗ Combination with ZC not available. ⊗ Combination with RC not available. For ATW, AJW, ALW and APW, there are working limits as follows. when $D \leqq 10$, $(\alpha - 0.6) \geqq W$ when $D \geqq 12$, $(\alpha - 0.4) \geqq W$ The trapezoidal taper angle (GC˚), which was previously fixed at 10˚, is now selectable from 10˚ and 7˚. Designation method AIW6—GC7 Specify in the sequence "(shape)(W dimension)—GC". If you do not specify GC, (AIW6) is always 10˚.	●W dimension and GC˚ selection W t GC˚ 3 2.5 4 3 5 3.5 6 4 8 5.5 10 7 GC˚: 7˚ 10˚	AIW		AHW		Quotation
			AXW		———		
			ATW		AJW		
			AKW		AEW		
			ALW		APW		
			AUW		ACW		
	Shape B (Semicircle)  ⊗ Combination with ZC not available. ⊗ Combination with RC not available. For BTR, BJR, BLR and BPR, there are working limits as follows. when $D \leqq 10$, $(\alpha - 0.6) \geqq 2 \times R$ when $D \geqq 12$, $(\alpha - 0.4) \geqq 2 \times R$ Designation method BXR3	●R dimension choices 1 1.25 1.5 1.75 2 2.25 2.5 3 3.5 4	BIR		BHR		
			BXR		———		
			BTR		BJR		
			BKR		BER		
			BLR		BPR		
			BUR		BCR		
	Shape C (Arc+Tangent)  ⊗ Combination with ZC not available. ⊗ Combination with RC not available. For CTQ, CJQ, CLQ and CPQ, there are working limits as follows. when $D \leqq 10$, $(\alpha - 0.6) \geqq Q \times 1.09$ when $D \geqq 12$, $(\alpha - 0.4) \geqq Q \times 1.09$ Designation method CTQ4	●Q dimension choices 2 2.5 3 3.5 4 5 6 8	CIQ		CHQ		
			CXQ		———		
			CTQ		CJQ		
			CKQ		CEQ		
			CLQ		CPQ		
			CUQ		CCQ		

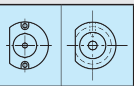
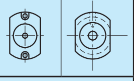
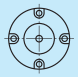
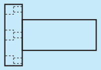
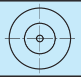
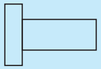
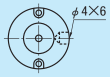
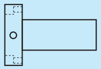
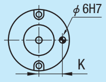
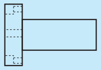
■Undercut Part Machining

Items	Codes	Specifications		1 Code
Undercut machining	ZC	 	Process undercut on the tip of sprue bushing as shown in the left drawing. Working limits $S \geqq \alpha + 2$ $1.5 \leqq U \leqq 5$ $\alpha + 2 \leqq T \leqq V - 2U\tan G$ Specification L max.$\geqq$L+U Unit of designation S,T,U=0.1mm increments Designation method ZC—S3.5—T4.0—U2.0	Quotation

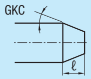
■Step R Processing

Items	Codes	Specifications			1 Code
Step R processing	RC	 	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. The step R is machined with an inner R cutter. Surface roughness and position precision are not provided.		Quotation
			Step R dimension choices 1 2	Available for $\alpha \geqq 5$ Straight type $D - \alpha - (2 \times RC)$ 2 Tapered type $V - \alpha - (2 \times RC)$ 2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

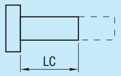
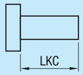
■Head Processing

Items	Codes	Specifications			1 Code
Flange cutting	KC			Adds a flat on the head Designation method KC8.5 Unit of designation 0.5mm increments ⊗ Combination with BC not available Use for key slotting or for preventing interference with other parts. ⊗ Combination with NC・KP not available ⊗ Not available for extension type/press fit type ⊗ Not available for string eliminator type	Quotation
	WKC			Adds two flats in parallel on the head. Designation method WKC6 Unit of designation 0.5mm increments ⊗ Combination with BC not available Use for key slotting or for preventing interference with other parts. ⊗ Combination with NC・KP not available ⊗ Not available for extension type/press fit type ⊗ Not available for string eliminator type	
Alteration of No. of bolt holes	BC			Adds 2 bolt holes. (4 holes in total) Designation method BC (Supplied bolts : 4) Available for Normal bolt type/Old JIS A type ⊗ Combination with KC・WKC not available ⊗ Combination with KP not available	
Alteration to no bolt hole	BN			Bolt hole is not processed. Designation method BN (No supplied bolt) Available for M S45C and HPM1 of normal bolt type/old JIS A type	
Dowel hole boring	NC	 		Adds a dowel hole. Designation method NC Available for Normal bolt type/Old JIS A type ⊗ Combination with KC・WKC not available ⊗ Not available for press fit type	
	KP	 The effective length of dowel hole is 10mm below underhead part. (recessed hole ϕ6.5)		Adds a precision dowel hole (longitudinal) Designation method KP Available for equivalent of HPM1 only ⊗ Not available for press fit type ⊗ Combination with KC・WKC not available ⊗ Not available for string eliminator type ⊗ Combination with NC not available ⊗ Combination with BC not available ※The position of dowel hole boring is half a position from the center of the pitch dimension between bolts. For 10mm head type:K=15mm For 15mm head type:K=19mm For 20mm head type:K=24.5mm For old JIS A type:K=B/2mm	

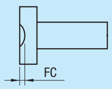
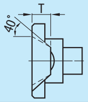
■Tip Tapering Angle Processing

Items	Codes	Specifications		1 Code
Range alterantion of G angle tolerance.	GKC	 	Changes the range of G tolerance. $G^{\circ}\,{}^{0}_{-30'} \cdots\rightarrow G^{\circ}\,{}^{0}_{-15'}$ ⊗ Combination with undercutting (ZC) not available ⊗ Extension type not available. Designation method GKC Available for tapered type when $\ell \leqq 15$ and $(L - \ell) \geqq 10$	Quotation

■L Dimension Processing

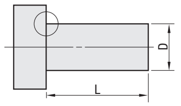
Items	Codes	Specifications		1 Code
L dimension alteration	LC	 	L dimension can be designated in 0.1mm increments. Finishes with a ${}^{+0.1}_{0}$ L dimension tolerance range. Designation method SBBP—B13—LC75.3—A2 Available for fixed L dimension type only. When combination with LKC, L dimension can be designated in 0.01mm.	Quotation
L dimension tolerance alteration	LKC	 	L dimension can be designated in 0.01mm increments. (For fixed L dimension type, it can be designated in 0.01mm increments only when combination with LC.) Finishes with a ${}^{0}_{-0.02}$ L dimension tolerance range. ⊗ Combination with undercutting (ZC) not available Designation method SBBP13—85.25—SR11—P3.5—A2—LKC	

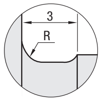
■Alteration of Nozzle Touch Part

Items	Codes	Specifications		1 Code
Change of depth of nozzle touch part	FC	 	For the alteration of nozzle touch part (SR) depth Note that when you use the FC code, the method of calculating the α dimension changes. Applicable to the N dimension specification type used for an extension nozzle. Available for flange thickness 8mm	Quotation
T dimension taper angle change	TFC	 	The T dimension taper angle will be changed. 30˚ (±30′) ···→ 40˚ (±30′) Designation method SXDM16—35.0—P3.5—A2—TFC Available only for extension type	

■About the head of sprue bushings

Relief processed in the flange neck part of sprue bushing (3mm range).
Because R is larger than the relief depth, do chamfering to installation holes.
(Please refer to each page for details.)

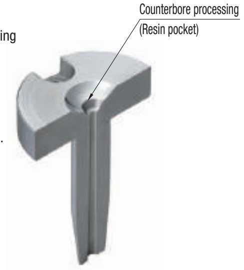




GUIDE FOR ECOLOGY SPRUE BUSHINGS

■Features

Most critical point in cost saving and productivity improvement is to reduce mold material and shorten the cycle time as well.
With its main feature to make diameter of the sprue thinner than the diameter of nozzle tip of molding machine, Ecology Sprue Bushings are available to provide following advantages.



Ecology Sprue Bushings

①Reducing resin material in the sprue runner

Available to reduce the resin material per one mold processing by making sprue diameter thinner and setting the minimum required runner size for the molding.

Example : Reduced resin amount at sprue and runner parts: 70% approx.

② Shortening the cycle time

By making sprue and runner parts thinner, this cooling effect improvement enables to shorten the cycle time.

Example : Cooling time saving: 3 seconds, instead of 6 seconds

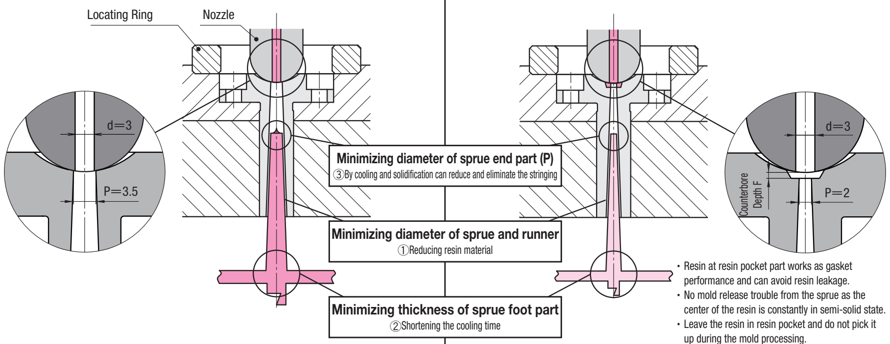
③ Reducing the stringing

Thinner diameter of sprue improves in quicker cooling and solidification which can reduce and eliminate the stringing.

Example : No stringing occurred

※For the details of practical examples, refer to Page 865 on the molding examples of Ecology Sprue Bushing.

Conventional type Sprue Bushings	**Ecology Sprue Bushings**
• Conventional sprue bushing is generally P＝d＋(0.5～1.0). • Avoid situations of resin leakage from nozzle touch part and mold release trouble from the sprue. • Sprue diameter (P) is determined by nozzle diameter of molding machine (d), therefore, thicker runner diameter is applied when smaller molded articles shaped.	• Sprue bushing with special counterbore processing (resin pocket) in nozzle touch part. • Available to make P＜d(Pmin.＝2.0) • Available to apply sprue diameter from the size or specifications of the molding article, instead of deciding from the nozzle diameter of molding machine.


Locating Ring
Nozzle
d=3
P=3.5
Minimizing diameter of sprue end part (P)
③By cooling and solidification can reduce and eliminate the stringing
Minimizing diameter of sprue and runner
①Reducing resin material
Minimizing thickness of sprue foot part
②Shortening the cooling time
d=3
Counterbore Depth F
P=2

- Resin at resin pocket part works as gasket performance and can avoid resin leakage.
- No mold release trouble from the sprue as the center of the resin is constantly in semi-solid state.
- Leave the resin in resin pocket and do not pick it up during the mold processing.

Molding by conventional Sprue Bushing (ABS resin)

Molding by Ecology Sprue Bushing (ABS resin)

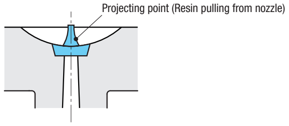
Resin at resin pocket part (Enlarged view)

■Notes on usage

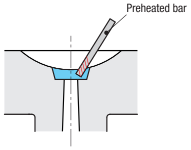
- Ecology Sprue Bushing is for the molding machines with nozzle tip diameter as approx. 3mm.
- Suitable depth of resin pocket (F) varies from applied resin and molding condition. Refer to page P.742 on "selection of resin pocket depth F".
- By using Ecology Sprue Bushing, you may select thinner sprue and runner, however, make sure to set minimum runner size required for stable mold processing.
- Molding condition set on the conventional sprue bush may not meet to the molding condition using this part. Due to narrowing the resin pathway by thinning the size of sprue and runner, you may need to change injection pressure or mold temperature according to resin material.
- At the time of starting mold processing, put the nozzle of mold machine to spure bushing and preheat for approx. one minute before using. Without any preheating, sprue releasing trouble may be occurred due to quicker time in cooling and solidification for the resin in the resin pocket.
- In case of lower temperature at the nozzle tip of the mold machine, resin at sprue end part and resin pocket may be solidified before filling up to cavity.
- Do not carry back the nozzle during mold processing. When the mold machine nozzle leaves away from the nozzle touch part, resin in the resin pocket becomes solid and resin filling will not be available.
- When the nozzle continues touching to the sprue bushing without any mold injection, the resin in resin pocket may be carbonized by nozzle heat. On this occasion, take away the resin in resin pocket before starting mold injection.
- At the time of discontinuation or completion of the mold injection work or resin material change, make sure to take away the resin in resin pocket before starting mold injection.
  Easier to take it away before the resin comes in completely solid. When the resin solidified, heat the resin again and take it away. When using tool for taking the resin away, take extra care avoiding scratch the surface of sprue bushing.
  Also, pay attention for injuries or burn with the nozzle or mold base at the time of taking the resin away.

[How to take away resin from resin pocket]

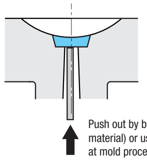
Example 1) In case of the resin in the resin pocket with projecting point, take it away from the nozzle side of the mold machine.
By using a tool of needle-nose pliers, you may easily nip the tip part.



Example 2) Attach preheated bar with burner and melt the resin in resin pocket. Then, take off after the resin becomes solid.
Easier to take off when the bar attaches at an angle position against the resin.



Example 3) In case of the resin without any projecting point, push out the resin in the resin pocket by using bar from parting side.



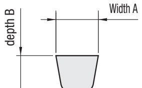
Push out by brass bar (with lower hardness material) or using sprue runner part obtained at mold processing.

EXAMINATION MOLDING BY ECOLOGY SPRUE BUSHINGS

■Molding examples

Molding condition :

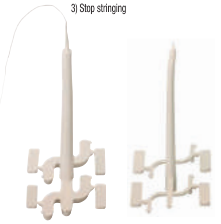
◯Injection machine : Clamping pressure 400kN (40tf), In-line screw type thermoplastic injection machine
◯Mold base :4 small mold articles per injection, mold articles size 15×4×1.5)
runner size adjustable for 4 levels.
◯Comparison : Conventional Sprue Bushing and Ecology Sprue Bushing
◯Judgment standard for the test result evaluation : Appearance and weight (±0.001g) of the mold article



Size of runner

[ABS resin]

1) Disposed waste resin - approx. 67% reduction
2) Cooling time - shorten in 3 seconds
3) Stop stringing



- Standard grade
- Un-reinforced resin (non-filler)
- Specific gravity : 1.04

	Conventional Sprue Bushings P=3.5	Ecology Sprue Bushings P=2 F=0.8
Runner Size A (Width) B (Depth)	A=4, B=3.5	A=1.4, B=1.2
Weight (g) per one mold article	0.094	0.094
Weight of waste resin at sprue runner part	2.378	0.779
Nozzle temperature (℃)	225	225
Cavity temperature (℃)	62	62
Injection pressure (MPa){kgf/cm²}	71{724}	101.5{1035}
Cooling time (Sec)	6	3
Cycle time (Sec)	16.9	13.3

Example (Estimate) Case of injecting 100,000 mold articles with ABS resin material by mold base of 4 articles per injection and 25,000 shots

	Conventional Sprue Bushings	Ecology Sprue Bushings
Weight of waste resin at sprue runner part	59.5kg	19.5kg
Waste resin weight ratio against finished mold articles	16%	48%
Required molding processing time (based on 8 hours per day)	14.7 days	11.5 days

By changing conventional sprue bushing to Ecology Sprue Bushing, 40 kgs were cut down in waste resin and enabled to shorten the molding processing time to 3.2 days (25.6 hours) as well.

Reducing weight of waste resin and energy saving (cut down electricity expense) leads to CO_2 reduction.

[Polypropylene resin (PP)]

1) Disposed waste resin - approx. 69% reduction
2) Cooling time - shorten in 3 seconds

- Standard grade
- Un-reinforced resin (non-filler)
- Specific gravity : 0.9

	Conventional Sprue Bushings P=3.5	Ecology Sprue Bushings P=2 F=0.8
Runner Size A (Width) B (Depth)	A=4, B=3.5	A=1.4, B=1.2
Weight (g) per one mold article	0.075	0.074
Weight of waste resin at sprue runner part	1.91	0.591
Nozzle temperature (℃)	200	200
Cavity temperature (℃)	43	43
Injection pressure (MPa){kgf/cm²}	71{724}	71{724}
Cooling time (Sec)	8	5
Cycle time (Sec)	18.6	11.8

[Metacrylate resin (PMMA)]

1) Disposed waste resin - approx. 63% reduction
2) Cooling time - shorten in 5 seconds
3) Stop stringing

- Standard grade
- Un-reinforced resin (non-filler)
- Specific gravity : 1.19

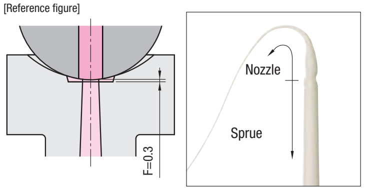
	Conventional Sprue Bushings P=3.5	Ecology Sprue Bushings P=2.0 F=1.0
Runner Size A (Width) B (Depth)	A=4, B=3.5	A=2, B=1.6
Weight (g) per one mold article	0.105	0.105
Weight of waste resin at sprue runner part	2.636	0.979
Nozzle temperature (℃)	260	260
Cavity temperature (℃)	75	75
Injection pressure (MPa){kgf/cm²}	101.5{1035}	152.3{1553}
Cooling time (Sec)	10	5
Cycle time (Sec)	20.3	15.3

■Selection of resin pocket depth F

Finished mold article condition in Ecology Sprue Bushing is depending on the size of resin pocket depth F.
Referring to the chart below mentioned on the relationship with mold resin and resin pocket depth F sizes available for mold processing, select the suitable resin pocket depth F.

·In case shallow resin pocket depth F (F=0.3)

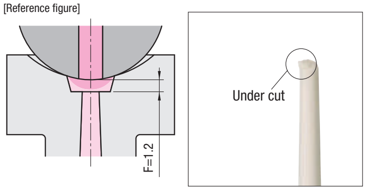
[Reference figure]



Stringing is occurred as the sprue does not cut at the resin pocket and pulls out the resin from the nozzle tip.

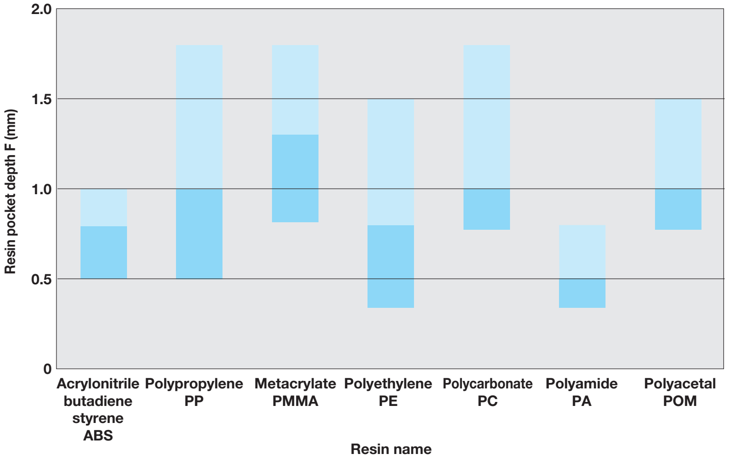
·In case deeper resin pocket depth F (F=1.2)

[Reference figure]



Mold release trouble is occurred as the resin in sprue pocket becomes solidified and unified with sprue.

Relationship with mold resin and resin pocket depth F sizes available for mold processing.



Resin pocket depth F
0.3
0.5
0.8
1.0
1.2
1.5
1.8
2.0

▨ Available mold processing range (based on test result)
■ MISUMI's recommended range

◯Select the suitable resin pocket depth F from the above chart.
◯Stable mold processing may not be done when the resin pocket depth F deeper due to rapid cooling and solidification at the bottom part of the resin pocket. Therefore, shallower depth is recommendable.
◯This testing is an example and considers this chart as reference purpose for selecting suitable resin pocket depth F.
Note on the possibilities of stringing or mold release trouble depending on the using resin grade, mold machine type and mold conditions.

HPM1
equivalent
SKD61

ECOLOGY SPRUE BUSHINGS

—NORMAL BOLT TYPE・FLANGE THICKNESS 10mm—

Non JIS material definition is listed on P.1351 - 1352

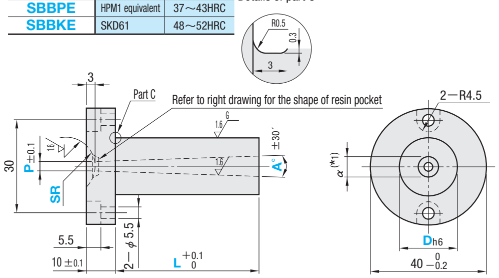
—Straight type—

RoHS

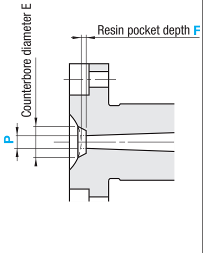
Part Number	M	H
SBBPE	HPM1 equivalent	37~43HRC
SBBKE	SKD61	48~52HRC

Details of part C

A CB5—12 (2 pcs.)



■Details for the resin pocket



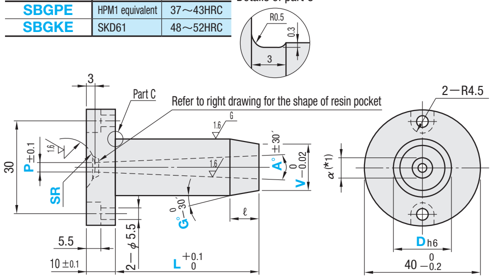
—Tapered type—

RoHS

Part Number	M	H
SBGPE	HPM1 equivalent	37~43HRC
SBGKE	SKD61	48~52HRC

Details of part C

A CB5—12 (2 pcs.)



Sprue diameter P	Counterbore diameter E
2	6.5
2.5	
3	7

For the details of resin pocket depth F, refer to P.742 of the selection of resin pocket depth F.

Dh6		Part Number		L(*2)	SR	(*3) P	(*3) A°	F	V	G°
		Type	D	0.1mm increments			0.5° increments		0.1mm increments	1° increments
8	$^{0}_{-0.009}$	—Straight type— (HPM1 equivalent) **SBBPE** (SKD61) **SBBKE**	8(*4)	0~ 80.0	10.5 11	2 2.5 3	0.5~3	0.3 0.5 0.8 1 1.2 1.5 1.8 2	$D>V\geqq\alpha+2$ Available for tapered type only	1~10 Available for tapered type only
10			10	0~120.0			0.5~4			
12	$^{0}_{-0.011}$		12	0~150.0						
13		—Tapered type— (HPM1 equivalent) **SBGPE** (SKD61) **SBGKE**	13							
16			16							
20	$^{0}_{-0.013}$		20	0~200.0						

(*1) The value of α is set in accordance with L dimension.

(*2) L dimension is restricted by P, V and A.
Similarly, G is restricted by L dimension.

(*3) L dimension limits

P	2			2.5			3	
A	0.5	1	1.5~4.0	0.5	1	1.5~4.0	0.5	1~1.5
L dimension limit	30	50	85	45	50	85	60	85

(*4) Available only for SBBPE・SBBKE.

Working limits

Conversion Chart of Trigonometric Functions P.1337

- **Straight type**

$D-\alpha\geqq 2$ (Calculation of α value) $\alpha=P+2\{L+(U)+7\}\tan\frac{A}{2}$ U : with ZC alteration

- **Tapered type**

$V-\alpha\geqq 2$

$L-\ell\geqq 3$ (Calculation of ℓ value) $\ell=\frac{D-V}{2\tan(G-0.25)}$ ※0.25 is a value that takes G tolerance into account.

Order

Part Number	L	SR	P	A	F	V	G
SBBPE20	85.0	SR11	P2.5	A2	F1		
SBGKE20	35.5	SR11	P3	A2	F1	V18.0	G6

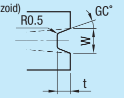
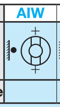
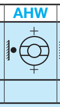
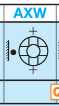
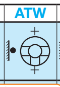
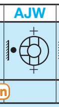
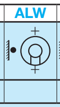
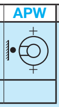
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	SR	P	A	F	V	G	(AIW・AXW…etc.)
SBGPE20	83.25	SR11	P2.5	A2	F1	V18.0	G8	BXR3—LKC

Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10—GC10 +Bolt hole position ・Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code	Quotation							

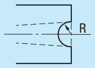
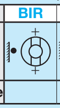
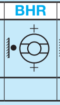
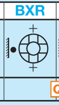
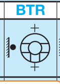
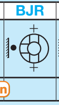
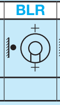
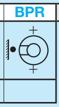
Combination with ZC not available.
Combination with RC not available.

ATW, AJW, ALW and APW have working limits as follows.
when $D\leqq10$, $(\alpha-0.6)\geqq W$ when $D\geqq12$, $(\alpha-0.4)\geqq W$

Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°".
If you do not make a specification, (AHW4, for example) will be 10°.

・W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

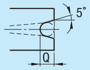
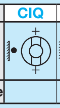
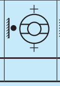
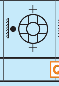
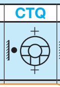
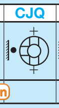
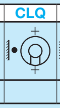
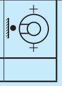
Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position ・Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code	Quotation							

Combination with ZC not available.
Combination with RC not available.

BTR, BJR, BLR and BPR have working limits as follows.
when $D\leqq10$, $(\alpha-0.6)\geqq 2\times R$
when $D\geqq12$, $(\alpha-0.4)\geqq 2\times R$

・R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

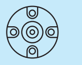
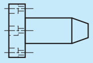
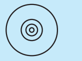
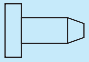
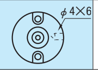
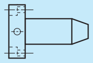
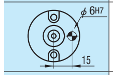
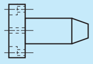
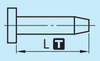
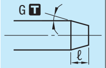
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position ・Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code	Quotation							

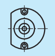
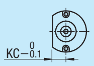
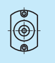
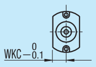
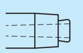
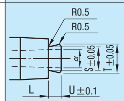
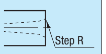
Combination with ZC not available
Combination with RC not available.

CTQ, CJQ, CLQ and CPQ have working limits as follows.
when $D\leqq10$, $(\alpha-0.6)\geqq Q\times1.09$
when $D\geqq12$, $(\alpha-0.4)\geqq Q\times1.09$

・Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

Alterations	Code	Spec.		1Code
	BC		Increases No. of bolt holes. No. of bolt holes : 2 ··· 4 (Supplied bolts : 4) Combination with NC not available.	Quotation
	BN		Decreases No. of bolt holes. No. of bolt holes : 2 ··· 0 (Supplied bolts : 0) M Available for equivalent of material HPM1	
	NC		Dowel hole boring	
	KP		Dowel hole boring (longitudinal) Combination with NC not available. Available for equivalent of HPM1 only	
	LKC		Changes L dimension tolerance $L^{+0.1}_{0}\cdots L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used Combination with ZC not available.	
	GKC		Changes the G tolerance. $G^{0}_{-30'}\cdots G^{0}_{-15'}$ Available for tapered type when $\ell\leqq15$ and $(L-\ell)\geqq10$ Combination with ZC not available.	

Alterations	Code	Spec.		1Code
	KC		Single flange cutting KC=0.5mm increments $D/2\leqq KC<20$ Combination with BC not available Combination with NC・KP not available Interference with the SR part may occur.	Quotation
	WKC		Two parallel flange cutting WKC=0.5mm increments $D/2\leqq WKC<20$ Combination with BC not available Combination with NC・KP not available Interference with the SR part may occur.	
	ZC		Undercut machining S, T, U=0.1mm increments $S\geqq\alpha+2$ $\alpha+2\leqq T\leqq D(V-2U\tan G)$ $1.5\leqq U\leqq5$ Specification L max.≧L+U Not available for D8 Designation method ZC—S3.5—T4.0—U2.0	
	RC		The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for $\alpha\geqq5$ ・Straight type $D-\alpha-(2\times RC)$ 2 ・Tapered type $V-\alpha-(2\times RC)>2$ Combination with shapes A, B and C not available. Combination with ZC not available.	

HPM1
equivalent
SKD61

ECOLOGY SPRUE BUSHINGS

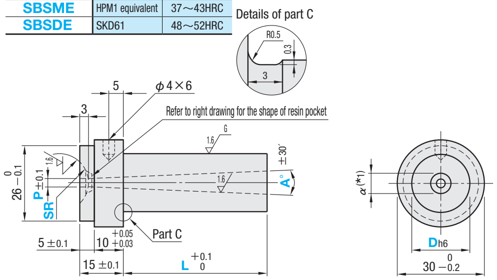
—SHOULDER TYPE—

Non JIS material definition is listed on P.1351 - 1352

—Straight type—

RoHS

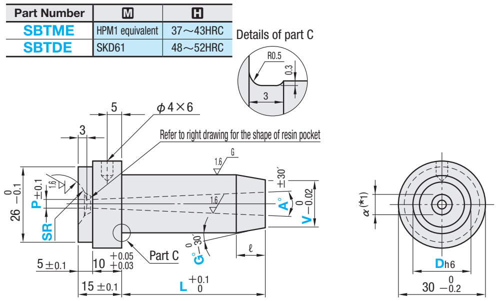
Part Number	M	H
SBSME	HPM1 equivalent	37～43HRC
SBSDE	SKD61	48～52HRC



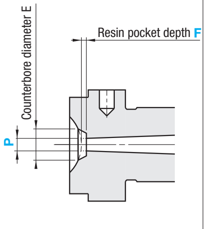
—Tapered type—

RoHS

Part Number	M	H
SBTME	HPM1 equivalent	37～43HRC
SBTDE	SKD61	48～52HRC



■Details for the resin pocket



Sprue diameter P	Counterbore diameter E
2	6.5
2.5	
3	7

For the details of resin pocket depth F, refer to P.742 of the selection of resin pocket depth F.

Dh6		Part Number Type	D	(*2)L 0.1mm increments	SR	(*3) P	(*3) A° 0.5° increments	F	V 0.1mm increments	G° 1° increments
8	0 −0.009	—Straight type— (HPM1 equivalent) SBSME (SKD61) SBSDE —Tapered type— (HPM1 equivalent) SBTME (SKD61) SBTDE	8 (*4)	0～ 80.0	10.5 11	2 2.5 3	0.5～3	0.3	D>V≧α+2 Available for tapered type only	1～10 Available for tapered type only
10			10	0～120.0			0.5～4	0.5		
12	0 −0.011		12	0～150.0				0.8		
13			13					1		
16			16					1.2		
20	0 −0.013		20	0～200.0				1.5		
25			25					1.8		
								2		

(*1) The value of α is set in accordance with L dimension.

(*2) L dimension is restricted by P, V and A.
Similarly, G is restricted by L dimension.

(*3) L dimension limits

P	2			2.5			3	
A	0.5	1	1.5～4.0	0.5	1	1.5～4.0	0.5	1～1.5
L dimension limit	30	50	85	45	50	85	60	85

(*4) Available only for SBSME・SBSDE.

Working limits

- **Straight type**
  $D-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+12\}\tan\frac{A}{2}$ U : with ZC alteration
- **Tapered type**
  $V-\alpha \geqq 2$
  $L-\ell \geqq 3$ (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$ ※0.25 is a value that takes G tolerance into account.

Conversion Chart of Trigonometric Functions P.1337

Order

Part Number	L	SR	P	A	F	V	G
SBSDE20	80.0	SR11	P3	A2	F1		
SBTME20	45.5	SR11	P3	A4	F1	V15.0	G5

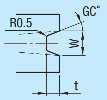
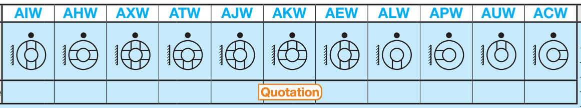
Days to Ship Quotation

P Price Quotation

Alterations

Part Number	L	SR	P	A	F	V	G	(AIW・AXW···etc.)
SBSME20	45.5	SR11	P3	A4	F1			AXW10—GC10—KC

Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	AKW	AEW	ALW	APW	AUW	ACW	Spec.
Shape A (Trapezoid) 	Spec.												• W dimension and GC° selection
	1Code	Quotation											

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

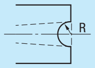
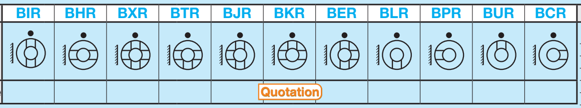
Designation method AIW10—GC7

- Dowel hole position KC position (When KC code is used)

⊗ Combination with ZC not available.
⊗ Combination with RC not available.

ATW, AJW, AKW, AEW, ALW APW, AUW and ACW have working limits as follows.
When D≦10, (α −0.6)≧W
When D≧12, (α −0.4)≧W

Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC° ". If you do not make a specification, (AHW4, for example) will be 10°.

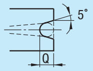
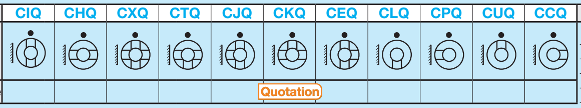
Alterations	Code	BIR	BHR	BXR	BTR	BJR	BKR	BER	BLR	BPR	BUR	BCR	Spec.
Shape B (Semicircle) 	Spec.												• R dimension selection 1 1.25 1.5 1.75 2 2.25 2.5 3 3.5 4
	1Code	Quotation											

Designation method BXR2

- Dowel hole position KC position (When KC code is used)

⊗ Combination with ZC not available.
⊗ Combination with RC not available.

BTR, BJR, BKR, BER, BLR, BPR, BUR and BCR have working limits as follows.
when D≦10, (α −0.6)≧2×R
when D≧12, (α −0.4)≧2×R

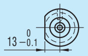
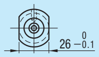
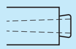
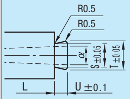
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CKQ	CEQ	CLQ	CPQ	CUQ	CCQ	Spec.
Shape C (Arc+Tangent) 	Spec.												• Q dimension selection 2 2.5 3 3.5 4 5 6 8
	1Code	Quotation											

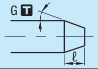
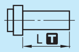
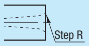
Designation method CTQ5

- Dowel hole position KC position (When KC code is used)

⊗ Combination with ZC not available.
⊗ Combination with RC not available.

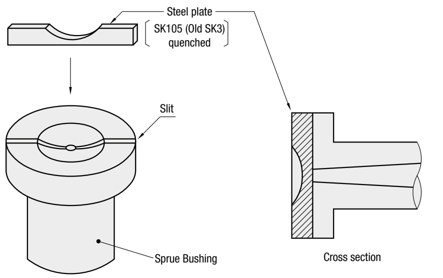
CTQ, CJQ, CKQ, CEQ, CLQ, CPQ, CUQ and CCQ have working limits as follows.
when D≦10, (α −0.6)≧Q×1.09
when D≧12, (α −0.4)≧Q×1.09

Alterations	Code	Spec.	1Code
	KC	 13 0 −0.1 Adds a key flat on the head.	Quotation
	WKC	 26 0 −0.1 Adds two parallel flats on the head.	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U ±0.1 ⊗ Not available for D8 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	

Alterations	Code	Spec.	1Code
 G T ℓ	GKC	Changes the G tolerance. $G_{-30'}^{0}$ ··· $G_{-15'}^{0}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.	Quotation
 L T	LKC	Changes L dimension tolerance $L_{0}^{+0.1}$ ··· $L_{-0.02}^{0}$ L dimension : 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 • Straight type D−α−(2×RC)>2 • Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

GUIDE FOR SPRUE BUSHINGS WITH STRING ELIMINATOR (H.N. SPRUE)

Non JIS material definition is listed on P.1351 - 1352

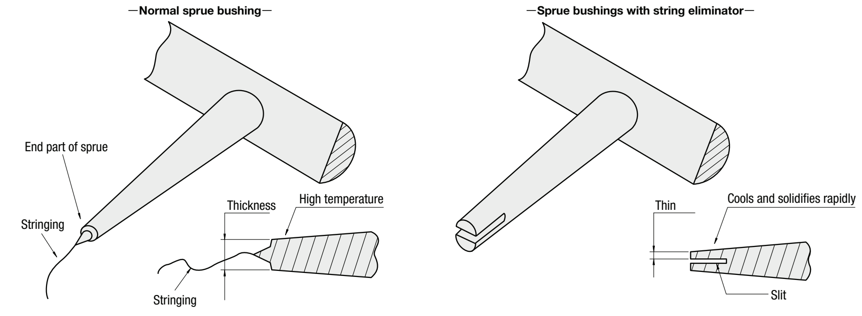


P	plate thickness (reference value)
3.0	0.56
3.5	0.66
4.0	0.88
4.5	1.08
5.0	1.28
6 or more	1.58

■Features of sprue bushings with string eliminator

This sprue bushing has been processed to eliminate "stringing" which occurs when the end of the sprue is being removed from the bushing.

A thin metal sheet is gently press-fitted into the flange of the bushing, and a slit (groove) is processed in the center of the end part of the sprue. As a result, cooling and solidification of the end part of the sprue is promoted, enabling "stringing" to be prevented.



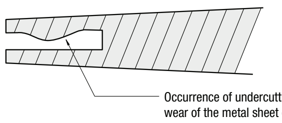
■Points to note for use

1. Install a cold slag well on the sprue lock before using the bushing.

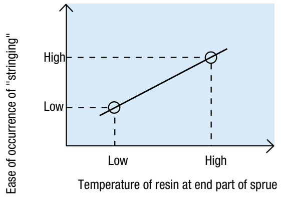
2. A metal sheet is press-fitted into the nozzle touch part of the injection molding machine, so when removing the sprue (resin) be sure to remove it from the parting face PL side.

3. If the temperature of the nozzle tip of the injection molding machine is too low, the end part of the sprue may solidify before all of the resin has been injected into the mold, so appropriately adjust the molding conditions. (The molding conditions set using the normal sprue bushing specifications sometimes differ from the molding conditions when this product is used.)

4. When using glass fiber filled resin, the metal sheet may wear as a result of long-term use, causing undercutting and poor mold separation. If mold separation trouble occurs frequently, change over the bushing with a new one.

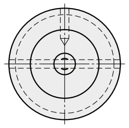

Occurrence of undercutting due to wear of the metal sheet of the slit

(Image diagram)

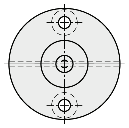


■ Stringing elimination prevention machining position

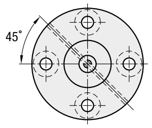
Shoulder type



Bolt type (2 holes)



Bolt type (4 holes)



■ List for sprue bushings with string eliminator

(Bolt Stopper type)

Category	Type		S45C	HPM1 equivalent	SKD61	DC53	Page
Normal bolt type (Flange thickness : 10mm) (P3.5, SR11)	Straight	Part Number	—	SBBPH—B	SBBKH—B	SBBSH—B	P.749
		Days to ship		Quotation			
Normal bolt type (Flange thickness : 10mm)	Straight	Part Number	—	SBBPH	SBBKH	SBBSH	P.751
		Days to ship		Quotation			
	Tapered	Part Number	—	SBGPH	SBGKH	SBGSH	P.751
		Days to ship		Quotation			
Normal bolt type (Flange thickness : 10mm) (Board thickness selection)	Straight	Part Number	—	SBBJH	SBBYH	—	P.753
		Days to ship		Quotation			
Normal bolt type (Flange thickness : 10mm) Old JIS A type	Straight	Part Number	SJACH	SJAMH	SJADH	—	P.755
		Days to ship	Quotation				
	Tapered	Part Number	SJGCH	SJGMH	SJGDH	—	P.755
		Days to ship	Quotation				
Proper bolt type (Flange thickness : 10mm)	Straight	Part Number	—	SBBMH	SBBDH	—	P.757
		Days to ship		Quotation			
	Tapered	Part Number	—	SBGMH	SBGDH	—	P.757
		Days to ship		Quotation			
Normal bolt type (Flange thickness : 15mm)	Straight	Part Number	—	SBBHH	SBBTH	SBBXH	P.761
		Days to ship		Quotation			
	Tapered	Part Number	—	SBGHH	SBGTH	SBGXH	P.761
		Days to ship		Quotation			
Normal bolt type (Flange thickness : 20mm)	Straight	Part Number	SBBFH	SBBRH	—	—	P.763
		Days to ship	Quotation				
	Tapered	Part Number	SBGFH	SBGRH	—	—	P.763
		Days to ship	Quotation				

Delivery days depend on subsidiary. P.45

(Shoulder type)

Category	Type		S45C	HPM1 equivalent	SKD61	DC53	Page
Shoulder type	Straight	Part Number	—	SBSMH	SBSDH	SBSSH	P.767
		Days to ship		Quotation			
	Tapered	Part Number	—	SBTMH	SBTDH	SBTSH	P.767
		Days to ship		Quotation			
Old JIS B type	Straight	Part Number	SJBCH	SJBMH	SJBDH	—	P.769
		Days to ship	Quotation				
	Tapered	Part Number	SJTCH	SJTMH	SJTDH	—	P.769
		Days to ship	Quotation				

HPM1 equivalent
SKD61
DC53 S45C

SPRUE BUSHINGS

P3.5 SR11

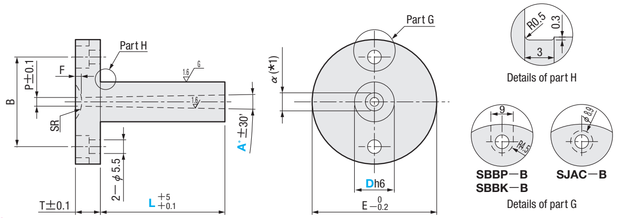
NORMAL BOLT TYPE・FIXED SIZE —BOLT FIXING TYPE / FLANGED TYPE—

Non JIS material definition is listed on P.1351 - 1352

This product is a standardized version of the most commonly designated size among the free designation types described on P.751. Use after L dimension finishing.

Bolt Fixing Type

Part Number		M	H
Nomal	String eliminator type		
SBBP−B	SBBPH−B	HPM1 equivalent	37～43HRC
SBBK−B	SBBKH−B	SKD61	48～52HRC
SBBS−B	SBBSH−B	DC53	58～62HRC
SJAC−B	—	S45C	—

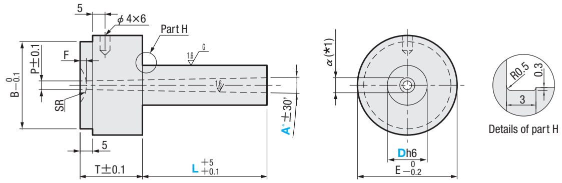

Part H
P±0.1
F
B
SR
1.6
6
2−φ5.5
T±0.1
L +5 +0.1
A°±30'
α(*1)
Part G
Dh6
E 0 −0.2
R0.5
0.3
3
Details of part H
9
SBBP−B
SBBK−B
SJAC−B
Details of part G

Details of string eliminator. P.747

A CB5−12(2pcs.)

Flanged Type

TYPE	M	H
SJBC−B	S45C	—


5
φ4×6
Part H
P±0.1
F
B 0 −0.1
SR
1.6
6
5
T±0.1
L +5 +0.1
A°±30'
α(*1)
Dh6
E 0 −0.2
R0.5
0.3
3
Details of part H

T	E	B	F	SR	P	Dh6		Part Number Type			D	L	A°	
									Normal	String eliminator type				
10	40	30	3	11	3.5	10	0 −0.009	(HPM1 equivalent)	SBBP−B	SBBPH−B	10	30 40 50 60 80	2	
								(SKD61)	SBBK−B	SBBKH−B		30 40 50 60		3
						13	0 −0.011	(DC53)	SBBS−B	SBBSH−B	13	30 40 50 60 80	2	3
						16					16	30 40 50 60 80	2	3
	35	25	2.5			13	0 −0.011	(S45C)	SJAC−B		13	100	2	3
	50	36				16					16	100	2	3
30	40	35	3			13		(S45C)	SJBC−B		13	100	2	3

＊1 (Calculation of α value) $\alpha = P + 2(L + T - F)\tan\frac{A}{2}$

Please adjust the length before using.

Order	Part Number	—	L	—	A
	SBBP−B10	—	40	—	A3

Days to Ship: Quotation

Price: Quotation

HPM1 equivalent
SKD61
DC53

SPRUE BUSHINGS

—NORMAL BOLT TYPE • FLANGE THICKNESS 10mm—

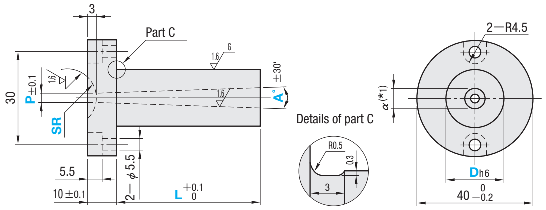
Electroforming P.773

Details of string eliminator (P.747)

—Straight type—

RoHS

Part Number		M	H
Normal	String eliminator type		
SBBP	SBBPH	HPM1 equivalent	37~43HRC
SBBK	SBBKH	SKD61	48~52HRC
SBBS	SBBSH	DC53	58~62HRC

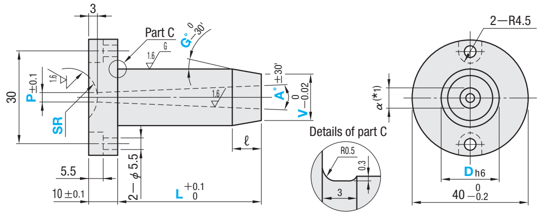


A CB5—12 (2 pcs.)

—Tapered type—

RoHS

Part Number		M	H
Normal	String eliminator type		
SBGP	SBGPH	HPM1 equivalent	37~43HRC
SBGK	SBGKH	SKD61	48~52HRC
SBGS	SBGSH	DC53	58~62HRC



A CB5—12 (2 pcs.)

Dh6		Part Number Type	D	L(*2) 0.1mm increments	SR	P	A° 0.5° increments	V 0.1mm increments	G° 1° increments
8	0 −0.009	—Straight type— Normal / String eliminator type (HPM1 equivalent) SBBP / SBBPH (SKD61) SBBK / SBBKH (DC53) SBBS / SBBSH —Tapered type— Normal / String eliminator type (HPM1 equivalent) SBGP / SBGPH (SKD61) SBGK / SBGKH (DC53) SBGS / SBGSH	(*5) 8	0~ 80.0	0 10.5 11	2 2.5 3 3.5	(*3) 0.5~3	$D>V\geqq\alpha+2$ Available for tapered type only	1~10 Available for tapered type only
10			10	(*7) 0~120.0	0 10.5 11 12 13 16 20(*4)	2(*3,4) 2.5(*3) 3(*3) 3.5 4 4.5 5 5.5 6 6.5 7 8	(*3) 0.5~4		
12	0 −0.011		12	(*7) 0~150.0					
13			13						
16			16						
20	0 −0.013		(*6) 20	(*7) 0~200.0					

(*1) The value of α is set in accordance with L dimension.
(*2) L dimension is restricted by P, V and A.
Similarly, G is restricted by L dimension.
(*4) Not available for products with string eliminator.
(*5) Available only for SBBP and SBBK
(*6) D20 cannot be designated for SBBS • SBBSH • SBGS • SBGSH
(*7) L dimension is up to 100 for SBBS • SBBSH • SBGS • SBGSH
Similar specifications : P3.5, SR11, L dimension selection type P.749

(*3) L dimension limits

P	2			2.5			3		3.5~4.5	
A	0.5	1	1.5~4.0	0.5	1	1.5~4.0	0.5	1~1.5	0.5	1~1.5
L dimension limits	30	50	85	45	50	85	60	85	60	150

Working limits Conversion Chart of Trigonometric Functions P.1337

- **Straight type**
  $D-\alpha\geqq2$ (Calculation of α value) $\alpha=P+2\{L+(U)+7\}\tan\frac{A}{2}$
  U : with ZC alteration
- **Tapered type**
  $V-\alpha\geqq2$
  $L-\ell\geqq3$ (Calculation of ℓ value) $\ell=\frac{D-V}{2\tan(G-0.25)}$

※ 0.25 is a value that takes G tolerance into account

Order

Part Number — L — SR — P — A — V — G
SBBP20 — 85.0 — SR16 — P2.5 — A2
SBGK20 — 35.5 — SR11 — P3 — A2 — V18.0 — G6

Days to Ship Quotation

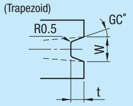
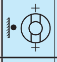
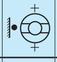
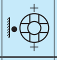
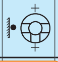
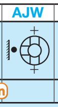
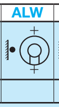
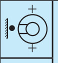
Non JIS material definition is listed on P.1351 - 1352

Price Quotation

Alterations

Part Number — L — SR — P — A — V — G — (AIW • AXW…etc.)
SBGPH20 — 83.25 — SR16 — P2.5 — A2 — V18.0 — G8 — BXR3 — LKC

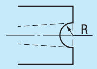
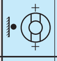
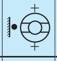
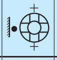
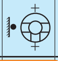
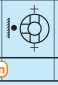
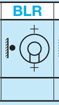
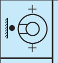
Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10—GC10 +Bolt hole position • Dowel hole position (When NC, KC code is used) KC position (When KC code is used)
	1Code				Quotation				

• W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

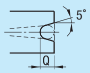
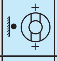
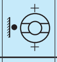
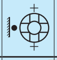
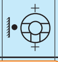
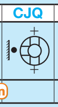
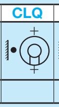
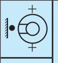
⊗ Combination with ZC not available.
⊗ Combination with RC not available.when
ATW, AJW, ALW and APW have working limits as follows.
$D\leqq10$, $(\alpha-0.6)\geqq W$ when $D\geqq12$, $(\alpha-0.4)\geqq W$
The trapezoidal taper angle, which was previously fixed at 10° , is now selectable from 10° and 7°.
Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC° ". If you do not make a specification, (AHW4, for example) will be 10° .

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position • Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code				Quotation				

• R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

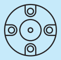
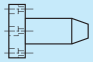
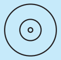
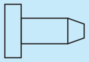
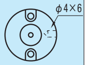
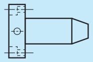
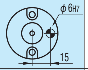
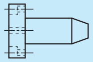
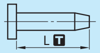
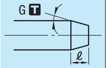
⊗ Combination with ZC not available.
⊗ Combination with RC not available.
BTR, BJR, BLR and BPR have working limits as follows.
when $D\leqq10$, $(\alpha-0.6)\geqq2\times R$
when $D\geqq12$, $(\alpha-0.4)\geqq2\times R$

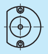
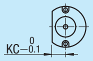
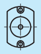
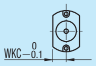
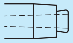
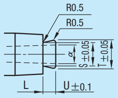
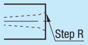
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position • Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code				Quotation				

• Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

⊗ Combination with ZC not available
⊗ Combination with RC not available.
CTQ, CJQ, CLQ and CPQ have working limits as follows.
when $D\leqq10$, $(\alpha-0.6)\geqq Q\times1.09$
when $D\geqq12$, $(\alpha-0.4)\geqq Q\times1.09$

Alterations	Code	Spec.	1Code
	BC	 Increases No. of bolt holes. No. of bolt holes : 2 ···→ 4 (Supplied bolts : 4) ⊗ Combination with NC not available.	Quotation
	BN	 Decreases No. of bolt holes. No. of bolt holes : 2 ···→ 0 (Supplied bolts : 0) M Available for equivalent of material HPM1	
 φ4×6	NC	 Dowel hole boring ⊗ Not available for string eliminator type	
 φ6H7 15	KP	 Dowel hole boring (longitudinal) ⊗ Not available for string eliminator type ⊗ Combination with NC not available. Available for equivalent of HPM1 only	
 L T	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···→ $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 G T ℓ	GKC	Changes the G tolerance. $G^{0}_{-30'}$ ···→ $G^{0}_{-15'}$ Available for tapered type when $\ell\leqq15$ and $(L-\ell)\geqq10$ ⊗ Combination with ZC not available.	

Alterations	Code	Spec.	1Code
	KC	 $KC^{0}_{-0.1}$ Single flange cutting KC=0.5mm increments $D/2\leqq KC<20$ ⊗ Combination with BC not available ⊗ Not available for string eliminator type ⊗ Combination with NC • KP not available Interference with the SR part may occur.	Quotation
	WKC	 $WKC^{0}_{-0.1}$ Two parallel flange cutting WKC=0.5mm increments $D/2\leqq WKC<20$ ⊗ Combination with BC not available ⊗ Not available for string eliminator type ⊗ Combination with NC • KP not available Interference with the SR part may occur.	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1 ⊗ Not available for D8 Undercut machining S, T, U=0.1mm increments $S\geqq\alpha+2$ $\alpha+2\leqq T\leqq D(V-2U\tan G)$ $1.5\leqq U\leqq5$ Specification L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for $\alpha\geqq5$ • Straight type $D-\alpha-(2\times RC)>2$ • Tapered type $V-\alpha-(2\times RC)>2$ ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

HPM1
equivalent
SKD61

SPRUE BUSHINGS

STRING ELIMINATOR TYPE

—NORMAL BOLT TYPE • FLANGE THICKNESS 10mm • BOARD THICKNESS (Y) SELECTION TYPE—

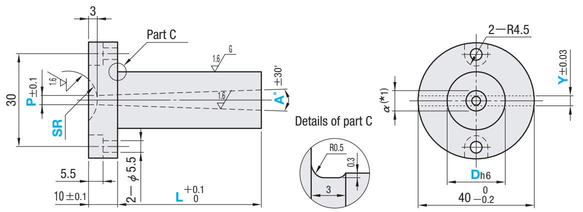
Non JIS material definition is listed on P.1351 - 1352

Details of string eliminator (P.747)

—Straight type—

Part Number String eliminator type	M	H
SBBJH	HPM1 equivalent	37～43HRC
SBBYH	SKD61	48～52HRC

RoHS



A CB5—12 (2 pcs.)

Dh6		Part Number Type	D	L(*2) 0.1mm increments	SR	P	A° 0.5° increments	Y
10	0 —0.009	—Straight type— String eliminator type (HPM1 equivalent) **SBBJH** (SKD61) **SBBYH**	10	0～120.0	0 10.5 11 12 13 16	2.5(*3) 3(*3) 3.5 4 4.5	0.5(*3) ～ 4.0	0.5 0.6
13	0 —0.011		13	0～150.0				
16			16					

(*1) The value of α is set in accordance with L dimension.

(*2) L dimension is restricted by P and A.

(*3) L dimension limits

P	2.5			3		3.5～4.5
A	0.5	1	1.5～4.0	0.5	1～1.5	0.5
L dimension limits	45	50	85	60	85	60

Working limits
$D-\alpha \geqq 2$

Conversion Chart of Trigonometric Functions P.1337

(Calculation of α value) $\alpha = P+2\{L+(U)+7\}\tan\frac{A}{2}$
U : with ZC alteration

Order

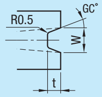
Part Number	—	L	—	SR	—	P	—	A	—	Y
SBBJH10	—	50.0	—	SR11	—	P3.5	—	A2	—	Y0.6

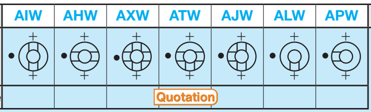
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	Y	—	(AIW・AXW···etc.)
SBBJH16	—	83.25	—	SR16	—	P2.5	—	A2	—	Y0.6	—	BXR3 — LKC

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW
Shape A (Trapezoid) 	1Code	Quotation						



Spec.: Designation method AIW10—GC7
+Bolt hole position

• W dimension and GC° selection

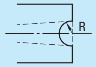
W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

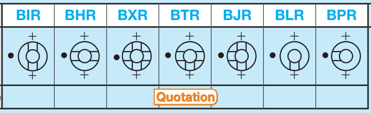
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

ATW, AJW, ALW and APW have working limits as follows.
when D=10, $(\alpha-0.6)\geqq W$
when D≧13, $(\alpha-0.4)\geqq W$

The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.

Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR
Shape B (Semicircle) 	1Code	Quotation						

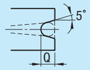


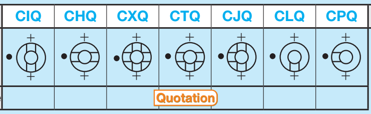
Spec.: Designation method BXR2
+Bolt hole position

• R dimension selection
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

⊗ Combination with ZC not available.
⊗ Combination with RC not available.

BTR, BJR, BLR and BPR have working limits as follows.
when D=10, $(\alpha-0.6)\geqq 2\times R$
when D≧13, $(\alpha-0.4)\geqq 2\times R$

Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ
Shape C (Arc+Tangent) 	1Code	Quotation						

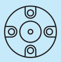
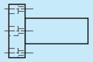
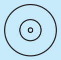
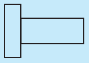
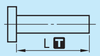


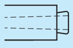
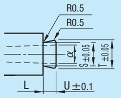
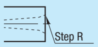
Spec.: Designation method CTQ5
+Bolt hole position

• Q dimension selection
2
2.5
3
3.5
4
5
6
8

⊗ Combination with ZC not available
⊗ Combination with RC not available.

CTQ, CJQ, CLQ and CPQ have working limits as follows.
when D=10, $(\alpha-0.6)\geqq Q\times1.09$
when D≧13, $(\alpha-0.4)\geqq Q\times1.09$

Alterations	Code	Spec.		1Code
	BC		Increases No. of bolt holes. No. of bolt holes : 2 ···› 4 (Supplied bolts : 4)	Quotation
	BN		Decreases No. of bolt holes. No. of bolt holes : 2 ···› 0 (Supplied bolts : 0) M Available for equivalent of material HPM1	
	LKC		L dimension tolerance alteration $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	

Alterations	Code	Spec.		1Code
	ZC		Undercut machining S, T, U=0.1mm increments $S\geqq\alpha+2$ $\alpha+2\leqq T\leqq D(V-2U\tan G)$ $1.5\leqq U\leqq5$ L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	Quotation
	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1 2 Available for $\alpha\geqq5$ $D-\alpha-(2\times RC)$ 2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	The step R is cut with an inner R cutter. Surface roughness and position precision are not provided.	

■Feature

The thickness of the metal sheet of this product that is lightly press-fit for eliminating stringing can be selected. The metal sheet is thinner than that of a normal type product, and also the height direction is set on the short side.

■Expected effectiveness

Minimizes reduction of the injection pressure.
Reduction of frequency of occurrence of sticking of the sprue to the metal sheet

■Guide to the selection of metal sheet (for reference)

It is recommended that you select the sheet thickness taking into consideration the size of the molding machine, resin used, etc.

Y0.5 → 15t or 30t class molding machine
Y0.6 → Molding machine of 50t or greater class

S45C
HPM1 equivalent
SKD61

SPRUE BUSHINGS
—OLD JIS A TYPE—

Non JIS material definition is listed on P.1351 - 1352

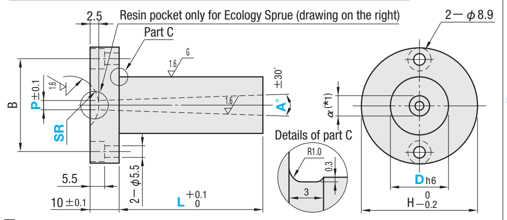
Electroforming P.773

Details of string eliminator (P.747)

— Straight type —

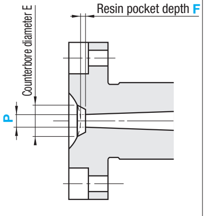
RoHS

Part Number			M	H
Normal	Ecology	String eliminator type		
SJAC	SJACE	SJACH	S45C	—
SJAM	SJAME	SJAMH	HPM1 equivalent	37～43HRC
SJAD	SJADE	SJADH	SKD61	48～52HRC



A CB5—12 (two)

■Details for the resin pocket

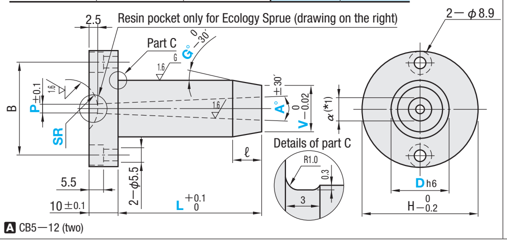


Ecology Sprue is available for SR10.5・11, P2・2.5・3 only.

— Tapered type —

RoHS

Part Number			M	H
Normal	Ecology	String eliminator type		
SJGC	SJGCE	SJGCH	S45C	—
SJGM	SJGME	SJGMH	HPM1 equivalent	37～43HRC
SJGD	SJGDE	SJGDH	SKD61	48～52HRC



A CB5—12 (two)

Sprue diameter P	Counterbore diameter E
2	6.5
2.5	
3	7

For the details of resin pocket depth F, refer to the "Selection of resin pocket depth F" P.742 of 2009 catalog.

H	B	Dh6		Part Number Type	D	L(*2) 0.1mm increments	SR	P	A° 0.5° increments	F	V 0.1mm increments	G° 1° increments
35	25	8	0 −0.009	—Straight type— Normal / Ecology (*6) / String eliminator type (S45C) SJAC SJACE SJACH (HPM1 equivalent) SJAM SJAME SJAMH (SKD61) SJAD SJADE SJADH —Tapered type— Normal / Ecology (*6) / String eliminator type (S45C) SJGC SJGCE SJGCH (HPM1 equivalent) SJGM SJGME SJGMH (SKD61) SJGD SJGDE SJGDH	8(*5)	0～ 80.0	0 10.5 11	2 2.5 3 3.5	1～3	0.3 0.5 0.8 1 1.2 1.5 1.8 2 Available for Ecology Sprue only	D>V≧α+2 Available for tapered type only	1～10 Available for tapered type only
		10			10	0～120.0	0 10.5 11 12 13	2(*3・4) 2.5(*3) 3(*3) 3.5 4 4.5 5	1～4(*3)			
		12	0 −0.011		12	0～150.0						
		13			13							
50	36	16			16		0 10.5 11 12 13 16					
		20	0 −0.013		20	0～200.0						

(*1) The value of α is set in accordance with L dimension.

(*2) L dimension is restricted by P, V and A.

(*3) L dimension limits

P	2		2.5		3	3.5～4.5
A	1	1.5～4.0	1	1.5～4.0	1～1.5	1～1.5
L dimension limits	50	85	50	85	85	150

(*4) Not available for products with string eliminator.

(*5) Available only for SJAM, SJAME, SJAD, and SJADE.

(*6) Ecology Sprue is available for SR10.5・11, P2・2.5・3 only.

Working limits

Conversion chart of trigonometric functions P.1337

・**Straight type**

$D-\alpha \geqq 2$(Calculation of α) $\alpha = P+2\{L+(U)+7.5\}\tan\frac{A}{2}$

U: with ZC alteration

・**Tapered type**

$V-\alpha \geqq 2$

$L-\ell \geqq 3$(Calculation of ℓ)$\ell = \frac{D-V}{2\tan(G-0.25)}$

※0.25 is a value that takes G tolerance into account.

Order

Part Number	L	SR	P	A	F	V	G
SJAC10	82.5	SR11	P3	A2			
SJGME20	85.0	SR10.5	P2.5	A2	F2	V18.0	G8

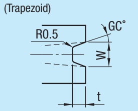
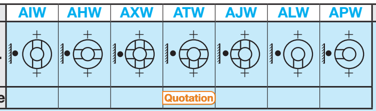
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	SR	P	A	V	G	(AIW・AXW···etc.)
SJAC16	65.02	SR11	P3.5	A3			CTQ5—LKC

Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10—GC10 +Bolt hole position ・Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code				Quotation				

・W dimension and GC° selection

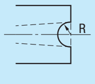
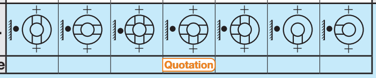
W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

Combination with ZC not available
Combination with RC not available

ATW・AJW・ALW・and APW have working limits as follows.
When D≦10, (α−0.6)≧W when D≧12, (α−0.4)≧W

Previously the trapezoidal taper angle was fixed at 10°, but it is possible to select a taper angle of either 10° or 7°.

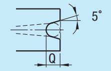
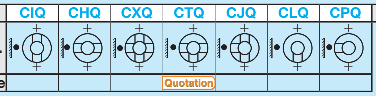
Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position ・Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code				Quotation				

・R dimension selection
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

Combination with ZC not available
Combination with RC not available

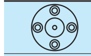
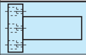
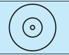
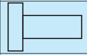
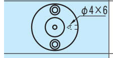
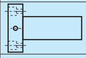
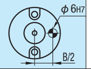
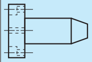
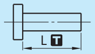
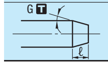
BTR・BJR・BLR・and BPR have working limits as follows.
When D≦10, (α−0.6)≧2×R
when D≧12, (α−0.4)≧2×R

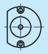
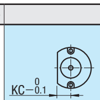
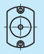
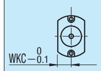
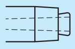
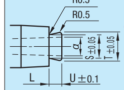
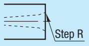
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position ・Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code				Quotation				

・Q dimension selection
2
2.5
3
3.5
4
5
6
8

Combination with ZC not available
Combination with RC not available

CTQ・CJQ・CLQ・and CPQ have working limits as follows.
When D≦10, (α−0.6)≧Q×1.09
when D≧12, (α−0.4)≧Q×1.09

Alterations	Code	Spec.		1Code
	BC		Increases No. of bolt holes. No. of bolt holes: 2 ···› 4 (Supplied bolts: 4) Combination with NC not available	Quotation
	BN		Decreases No. of bolt holes. No. of bolt holes: 2 ···› 0 (Supplied bolts: 0) M Available for S45C and HPM1 equivalent	
	NC		Dowel hole boring Not available for string eliminator type	
	KP		Dowel hole boring (longitudinal) Not available for string eliminator type Combination with NC not available Available for HPM1 equivalent only The effective length of dowel hole is 10mm below underhead part. (recessed hole φ6.5)	
	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ When LKC is used, L dimension alteration in 0.01mm increments possible Combination with ZC not available		
	GKC	Changes the G tolerance. $G^{0}_{-30'}$ ···› $G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 Combination with ZC not available		

Alterations	Code	Spec.		1Code
	KC		Single flange cutting KC= 0.5mm increments D/2≦KC<H/2 Combination with BC not available Not available for string eliminator type Combination with NC・KP not available Interference with the SR part may occur.	
	WKC		Two parallel flange cutting WKC=0.5mm increments D/2≦WKC<H/2 Combination with BC not available Not available for string eliminator type Combination with NC,・KP not available Interference with the SR part may occur.	
	ZC		Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 Specification Lmax.≧L+U Designation method ZC—S3.5—T4.0—U2.0	Quotation
	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type D−α−(2×RC)>2 ・Tapered type V−α−(2×RC)>2 Combination with shapes A・B・C not available Combination with ZC not available		

Not available for D8

HPM1
equivalent
SKD61

SPRUE BUSHINGS

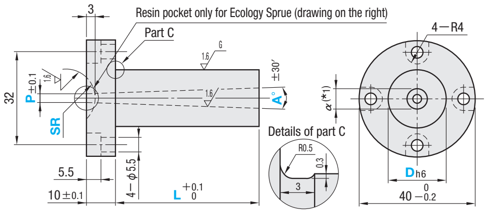
—PROPER BOLT TYPE—

Details of string eliminator P.747

—Straight type—

RoHS

Part Number			M	H
Normal	Ecology	String eliminator type		
SBBM	SBBME	SBBMH	HPM1 equivalent	37~43HRC
SBBD	SBBDE	SBBDH	SKD61	48~52HRC

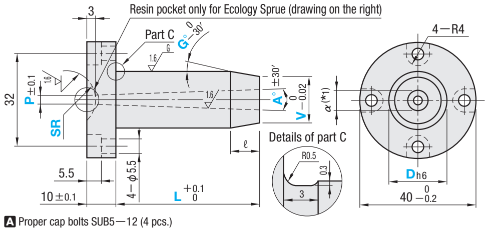


A Proper cap bolts SUB5—12 (4 pcs.)

—Tapered type—

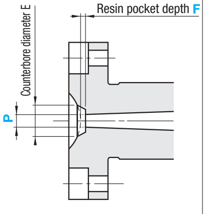
RoHS

Part Number			M	H
Normal	Ecology	String eliminator type		
SBGM	SBGME	SBGMH	HPM1 equivalent	37~43HRC
SBGD	SBGDE	SBGDH	SKD61	48~52HRC



A Proper cap bolts SUB5—12 (4 pcs.)

■Details for the resin pocket



Ecology Sprue is available for SR10.5・11, P2・2.5・3 only.

Sprue diameter P	Counterbore diameter E
2	6.5
2.5	
3	7

For the details of resin pocket depth F, refer to the "Selection of resin pocket depth F" P. 742

Dh6		Part Number Type	D	L(*2) 0.1mm increments	SR	P	A° 0.5° increments	F	V 0.1mm increments	G° 1° increments
10	$^{0}_{-0.009}$	—Straight type— Normal / Ecology (*5) / String eliminator type (HPM1 equivalent) SBBM SBBME SBBMH (SKD61) SBBD SBBDE SBBDH —Tapered type— Normal / Ecology (*5) / String eliminator type (HPM1 equivalent) SBGM SBGME SBGMH (SKD61) SBGD SBGDE SBGDH	10	0~120.0	0 10.5 11 12 13 16 20(*4) 21(*4) 23(*4)	2(*3,4) 2.5(*3) 3(*3) 3.5 4 4.5 5 5.5 6 6.5 7 8	(*3) 0.5~4	0.3 0.5 0.8 1 1.2 1.5 1.8 2 Available for Ecology Sprue only	D>V≧α+2 Available for tapered type only	1~10 Available for tapered type only
13	$^{0}_{-0.011}$		13	0~150.0						
16			16							
20	$^{0}_{-0.013}$		20	0~200.0						
25			25							

(*1)The value of α is set in accordance with L dimension.

(*2) L dimension is restricted by P, V and A.
Similarly, G is restricted by L dimension.

(*3) L dimension limits

P	2			2.5			3		3.5~4.5	
A	0.5	1	1.5~4.0	0.5	1	1.5~4.0	0.5	1~1.5	0.5	1~1.5
L dimension limits	30	50	85	45	50	85	60	85	60	150

(*4) Not available for products with string eliminator.

(*5) Ecology Sprue is available for SR10.5・11, P2・2.5・3 only.

Working limits   Conversion Chart of Trigonometric Functions P.1337

・**Straight type**

D−α≧2(Calculation of α) $\alpha=P+2\{L+(U)+7\}\tan\frac{A}{2}$

U: with ZC alteration

・**Tapered type**

V−α≧2

L−ℓ≧3(Calculation of ℓ) $\ell=\frac{D-V}{2\tan(G-0.25)}$

※0.25 is a value that takes G tolerance into account.

Order

Part Number	—	L	—	SR	—	P	—	A	—	F	—	V	—	G
SBBM 16	—	53.0	—	SR11	—	P3	—	A3						
SBGME25	—	85.0	—	SR10.5	—	P2	—	A2	—	F2	—	V22.0	—	G8

Days to Ship Quotation

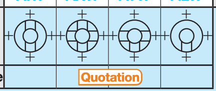
Non JIS material definition is listed on P.1351 - 1352

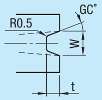
Price Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	F	—	V	—	G	—	(AIW・AXW…etc.)
SBGMH25	—	83.25	—	SR16	—	P2.5	—	A2			—	V22.0	—	G8	—	CTQ5—LKC

Quotation

Alterations	Code	AIW	AXW	ATW	ALW	Spec.
Shape A (Trapezoid)	Spec.					Designation method AIW10—GC10 +Bolt hole position
	1Code	Quotation				



・W dimension and GC° selection

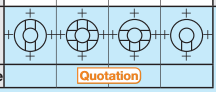
W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

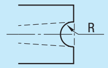
⊗ Combination with ZC not available
⊗ Combination with RC not available

ATW・ALW have working limits as follows.
When D=10, (α−0.6)≧W   When D≧13, (α−0.4)≧W

Previously the trapezoidal taper angle was fixed at 10°, but it is possible to select a taper angle of either 10° or 7°.

Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BXR	BTR	BLR	Spec.
Shape B (Semicircle)	Spec.					Designation method BXR2 +Bolt hole position
	1Code	Quotation				

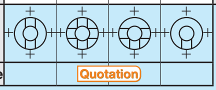


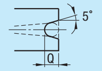
・R dimension selection

1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

⊗ Combination with ZC not available
⊗ Combination with RC not available

BTR・BLR have working limits as follows.
When D=10, (α−0.6) ≧2×R
when D≧13, (α−-0.4) ≧2×R

Alterations	Code	CIQ	CXQ	CTQ	CLQ	Spec.
Shape C (Arc+Tangent)	Spec.					Designation method CTQ5 +Bolt hole position
	1Code	Quotation				

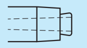
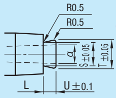
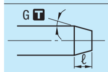


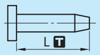
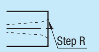
・Q dimension selection

2
2.5
3
3.5
4
5
6
8

⊗ Combination with ZC not available
⊗ Combination with RC not available

CTQ・CLQ have working limits as follows.
When D=10, (α−0.6) ≧Q×1.09
when D≧13, (α−0.4) ≧Q×1.09

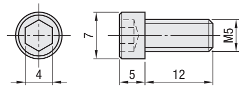
Alterations	Code	Spec.	1Code
	ZC	 Undercut machining S,T,U: 0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 Specification Lmax.≧L+U Designation method ZC—S3.5—T4.0—U2.0	Quotation
	GKC	Changes the G tolerance. $G^{\ 0}_{-30'}$ ⋯→ $G^{\ 0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ) ≧10 ⊗ Combination with ZC not available	

Alterations	Code	Spec.	1Code
	LKC	L dimension tolerance alteration $L^{+0.1}_{\ 0}$ ⋯→ $L^{\ 0}_{-0.02}$ When LKC is used, L dimension alteration in 0.01mm increments possible ⊗ Combination with ZC not available	Quotation
	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type D−α−(2×RC)>2 ・Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A・B・C not available ⊗ Combination with ZC not available	

■Special bolt

RoHS

SUB



Part Number	U/Price
SUB5—12	Quotation

Order

Part Number
SUB5—12

Days to Ship Quotation

The proper bolt type specially designed for sprue bushings(4 pieces are supplied with each sprue bushing. Do not use this bolt for other purpose than mounting these sprue bushings.

SUS420J2
equivalent
SKD61

COOLING SPRUE BUSHINGS

—NORMAL BOLT TYPE・FLANGE THICKNESS 10MM—

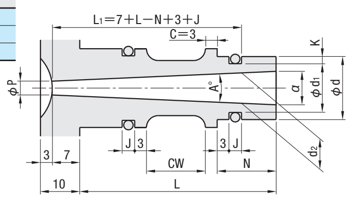
Non JIS material definition is listed on P.1351 - 1352

RoHS

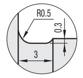
Part Number		M	H
Normal	String eliminator type		
SBCK	SBCKH	SUS420J2 equivalent	47～50HRC
SBCS	SBCSH		37～43HRC
SBCD	SBCDH	SKD61	48～52HRC

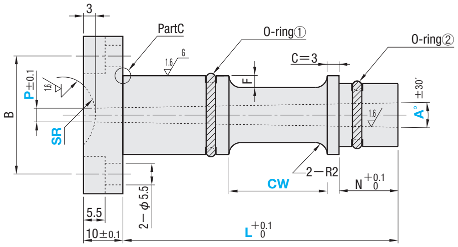
A
①②O-ring (one each)
③CB5−12 (two)

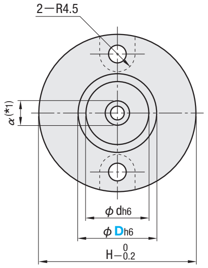
Sectional detail



Details of part C







H	B	O-ring		Groove width J		Groove depth K		N	d	F	Part Number		L	SR	P	A°	Groove width CW
		①	②	Part①	Part②	Part①	Part②				Type	D	0.1mm increments			0.5° increments	1mm increments
40	30	ORP12	NSF11.2	3.2	2.5	2	1	13	13	2	Normal SBCK SBCS SBCD	16	40.0～100.0	10.5 11 12 13 16 20	2 2.5 3 3.5	0.5～2	6～40 CW dimension limit CW≦L−N−16
		ORP16	ORP12	3.2		2	2	16	16	2.5	String eliminator type SBCKH SBCSH SBCDH	20	40.0～150.0		2 2.5 3 3.5 4 4.5	0.5～3.5	

(*1) The value of α is set in accordance with L dimension.
(*2) L dimension is restricted by P and A.
(*3) L dimension limits

P	2			2.5			3～4.5	
A	0.5	1	1.5～3.5	0.5	1	1.5～3.5	0.5	1～1.5
L dimension limits	Not Available	50	85	45	50	85	60	150

Working limits

$\alpha = P + 2(L+7)\tan\frac{A}{2}$

$d_1 = d - 2K$

$d_2 = P + 2L_1 \cdot \tan\frac{A}{2}$

$d_2 \leqq d_1 - 4$

Convercion chart of Trigono metric Functions P.1337

Order

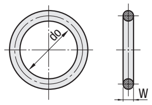
Part Number	—	L	—	SR	—	P	—	A	—	CW
SBCK 20	—	50	—	SR11	—	P2	—	A2	—	CW10

Days to Ship Quotation

■Characteristics

- The cycle time can be shortened by directly cooling the sprue bushing with cooling water.
- Use a stainless type if you are concerned about corrosion-resistance of SKD61.
- Water as well as air can be used for cooling. (Air jet cooler for mold)

■O-ring



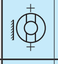
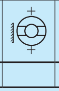
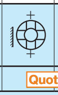
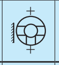
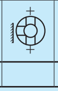
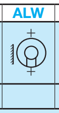
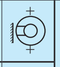
Part Number	do(inner diameter)	W (thickness)
NSF11.2	10.7	1.5
ORP12	11.8	2.4
ORP16	15.8	

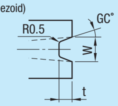
- ORP P.1137
- NSF Published on FA Mechanical Standard Components Catalog.

Price Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	CW	—	(AIW・AXW···etc.)
SBCK 20	—	50	—	SR11	—	P2	—	A2	—	CW10	—	AIW10−GC7−WKC25

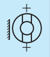
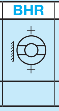
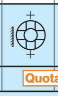
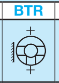
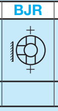
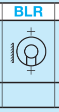
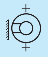
Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid)	Spec.								Designation method AIW10−GC7 +Bolt hole position KC position (When KC code is used)
	1Code			Quotation					

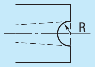


This has the following making limit. (α −0.4)≧W
The trapezoidal taper angle is selectable from 10° and 7° .
Designation method AHW4−GC7 Specify in the sequence"(shape) (W dimension)−GC°". If you do not make a specification, (AHW4, for example) will be 10° .

・W dimension・GC° selection

D	W	t	GC°
16・20	3	2.5	7°
	4	3	
	5	3.5	
	6	4	10°
	8	5.5	
20	10	7	

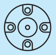
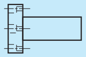
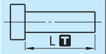
Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle)	Spec.								Designation method BXR2 +Bolt hole position KC position (When KC code is used)
	1Code			Quotation					

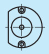
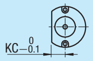
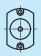
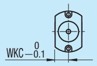
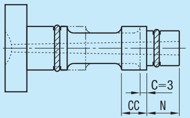


This has the following making limit.
(α −0.4)≧2×R

・R dimension selection

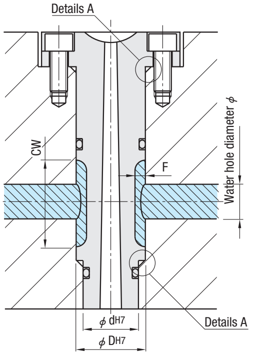
R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

Alterations	Code	Spec.	1Code
	BC	 Increases No. of bolt holes. No. of bolt holes: 2 ···› 4 (Supplied bolts: 4)	Quotation
	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ When LKC is used, L dimension alteration in 0.01mm increments possible	

Alterations	Code	Spec.	1Code
	KC	 Single flange cutting KC=0.5mm increments D/2≦KC<20 ⊗ Not available for string eliminator type Interference with the SR part may occur.	Quotation
	WKC	 Two parallel flange cutting WKC=0.5mm increments D/2≦WKC<20 ⊗ Not available for string eliminator type Interference with the SR part may occur.	
Cooling groove Position alteration	CC	Starting point change of cooling groove (C=3mm part thickness change) CC=1mm increments 3<CC≦L−N−CW−13 The position of O ring ① varies with CC and CW values. Designation method CC8 	

D	N
16	13
20	16

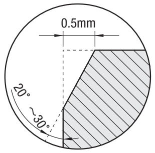
Example



■Recommended CW Dimension

D	F	Water hole diameter φ	CW
16	2	6	8～
		8	14～
		10	22～
		12	30～
		14	40～
20	2.5	6	8～
		8	12～
		10	16～
		12	24～
		14	32～

Details A: chamfering method when O ring is mounted



■Notes on handling

- Please finish it until the surface roughness on the plate side in contact with O ring reaches $^{1.6}\surd$.
- Before inserting the sprue bushing, apply special grease on the O ring to protect it from breakage.
- The recommended tolerance of sprue bushing hole on the mold side is H7.

HPM1 equivalent
SKD61
DC53

SPRUE BUSHINGS

—NORMAL BOLT TYPE • FLANGE THICKNESS15mm—

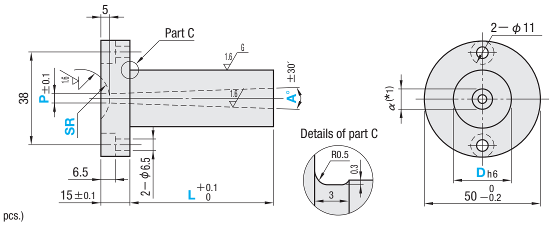
Electroforming P.773

Details of string eliminator P.747.

— Straight type —

RoHS

Part Number		M	H
Normal	String eliminator type		
SBBH	SBBHH	HPM1 equivalent	37～43HRC
SBBT	SBBTH	SKD61	48～52HRC
SBBX	SBBXH	DC53	58～62HRC

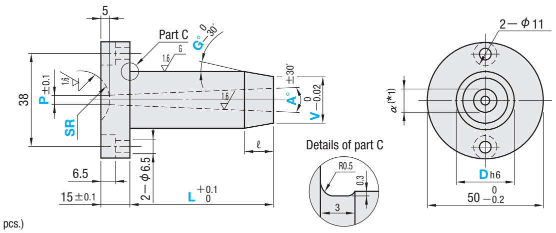


A CB6—15 (2 pcs.)

— Tapered type —

RoHS

Part Number		M	H
Normal	String eliminator type		
SBGH	SBGHH	HPM1 equivalent	37～43HRC
SBGT	SBGTH	SKD61	48～52HRC
SBGX	SBGXH	DC53	58～62HRC



A CB6—15 (2 pcs.)

Dh6		Part Number Type	D	L(*2) 0.1mm increments	SR	P	A° 0.5° increments	V 0.1mm increments	G° 1° increments
16	0 −0.011	—Straight type— Normal / String eliminator type (HPM1 equivalent) SBBH SBBHH (SKD61) SBBT SBBTH (DC53) SBBX SBBXH —Tapered type— Normal / String eliminator type (HPM1 equivalent) SBGH SBGHH (SKD61) SBGT SBGTH (DC53) SBGX SBGXH	16	30.0～150.0 (*5)	0(*6) 10.5 11 12 13 16 20 21 23	2 (*3,4) 2.5(*3) 3 (*3) 3.5 4 4.5 5 5.5 6 6.5 7 8	1～4 (*3)	D>V≧α+2 Available for tapered type only	1～10 Available for tapered type only
20	0 −0.013		20	30.0～200.0 (*5)					
25			25						

(*1) The value of α is set in accordance with L dimension.
(*2) L dimension is restricted by P, V and A.
Similarly, G is restricted by L dimension.
(*4) Not available for products with string eliminator.
(*5) L dimension is up to 100.0 for SBBX • SBBXH • SBGX • SBGXH.
(*6) SR0 cannot be designated for SBBX • SBBXH • SBGX • SBGXH.

(*3) L dimension limits

P	2		2.5		3	3.5～4.5
A	1	1.5～4.0	1	1.5～4.0	1～1.5	1～1.5
L dimension limit	50	85	50	85	85	150

Working limits

Conversion Chart of Trigonometric Functions P.1337

- **Straight type**
  $D-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+10\}\tan\frac{A}{2}$
  U : with ZC alteration
- **Tapered type**
  $V-\alpha \geqq 2$
  $L-\ell \geqq 3$ (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$

※0.25 is a value that takes G tolerance into account.

Order

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G
SBBH16	—	35.0	—	SR11	—	P3	—	A2				
SBGH25	—	100.0	—	SR16	—	P3.5	—	A2	—	V22.0	—	G8

Days to Ship Quotation

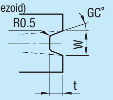
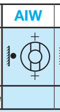
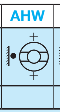
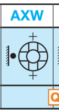
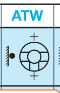
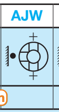
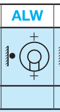
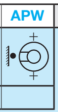
Non JIS material definition is listed on P.1351 - 1352

Price Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G	—	(AIW • AXW···etc.)
SBGHH25	—	99.98	—	SR16	—	P3.5	—	A2	—	V22.0	—	G8	—	AIW10−GC7−LKC

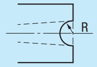
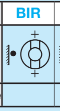
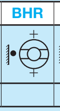
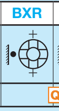
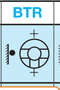
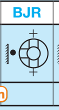
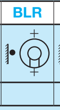
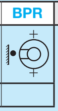
Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10—GC7 +Bolt hole position • Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code	Quotation							

• W dimension and GC° selection

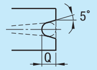
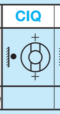
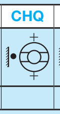
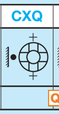
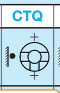
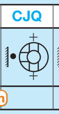
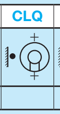
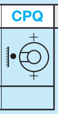
W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

⊗ Combination with ZC not available.
⊗ Combination with RC not available.
ATW, AJW, ALW and APW have working limits as follows.
$(\alpha-0.4) \geqq W$
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position • Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code	Quotation							

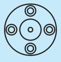
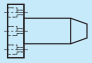
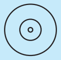
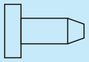
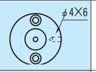
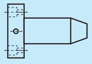
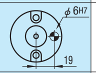
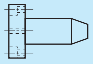
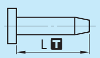
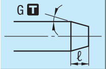
• R dimension selection
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

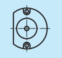
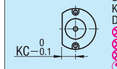
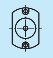
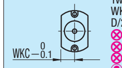
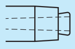
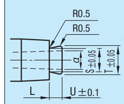
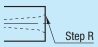
⊗ Combination with ZC not available.
⊗ Combination with RC not available.
BTR, BJR, BLR and BPR have working limits as follows.
$(\alpha-0.4) \geqq 2 \times R$

Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position • Dowel hole position (When NC, KP code is used) KC position (When KC code is used)
	1Code	Quotation							

• Q dimension selection
2
2.5
3
3.5
4
5
6
8

⊗ Combination with ZC not available
⊗ Combination with RC not available.
CTQ, CJQ, CLQ and CPQ have working limits as follows.
$(\alpha-0.4) \geqq Q \times 1.09$

Alterations	Code	Spec.		1Code
	BC		Increases No. of bolt holes. No. of bolt holes : 2 ···➝ 4 (Supplied bolts : 4) ⊗ Combination with NC not available.	
	BN		Decreases of bolt holes. No. of bolt holes : 2 ···➝ 0 (Supplied bolts : 0) M Available for equivalent of material HPM1	
 ϕ4×6	NC		Dowel hole boring ⊗ Not available for string eliminator type	Quotation
 ϕ6H7 19	KP		Dowel hole boring (longitudinal) ⊗ Not available for string eliminator type ⊗ Combination with NC not available. Available for equivalent of HPM1 only The effective length of dowel hole is 10mm below underhead part. (recessed hole ϕ6.5)	
 L T	LKC		L dimension tolerance alteration $L^{+0.1}_{0} \cdots\rightarrow L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 G T ℓ	GKC		Changes the G tolerance. $G^{0}_{-30'} \cdots\rightarrow G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.	

Alterations	Code	Spec.		1Code
	KC	 $KC^{0}_{-0.1}$	Single flange cutting KC=0.5mm increments D/2≦KC<25 ⊗ Combination with BC not available ⊗ Not available for string eliminator type ⊗ Combination with NC • KP not available Interference with the SR part may occur.	
	WKC	 $WKC^{0}_{-0.1}$	Two parallel flange cutting WKC=0.5mm increments D/2≦WKC<25 ⊗ Combination with BC not available ⊗ Not available for string eliminator type ⊗ Combination with NC • KP not available Interference with the SR part may occur.	Quotation
	ZC		Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 Specification L max.≧L+U Designation method ZC−S3.5−T4.0−U2.0	
	RC		The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 • Straight type D−α−(2×RC)>2 • Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

S45C
HPM1
equivalent

SPRUE BUSHINGS

—NORMAL BOLT TYPE・FLANGE THICKNESS 20mm—

Non JIS material definition is listed on P.1351 - 1352

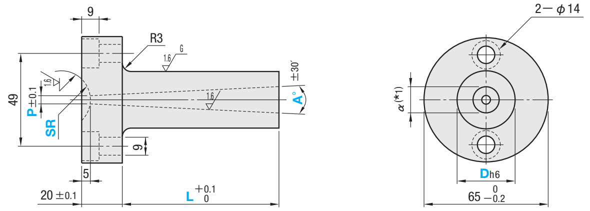
Electroforming P.773

Details of string eliminator P.747.

— Straight type —

RoHS

Part Number		M	H
Normal	String eliminator type		
SBBF	SBBFH	S45C	—
SBBR	SBBRH	HPM1 equivalent	37～43HRC

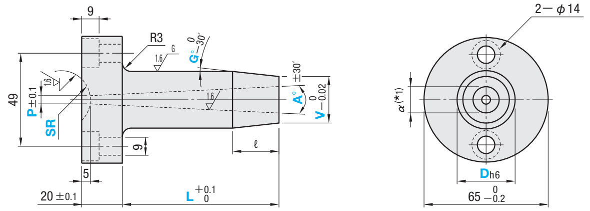


A CB8—20 (2 pcs.)

— Tapered type —

RoHS

Part Number		M	H
Normal	String eliminator type		
SBGF	SBGFH	S45C	—
SBGR	SBGRH	HPM1 equivalent	37～43HRC



A CB8—20 (2 pcs.)

Dh6		Part Number		L	SR	P	A°	V	G°
		Type	D	0.1mm increments			0.5° increments	0.1mm increments	1° increments
20	0 −0.013	—Straight type— Normal String eliminator type (S45C) SBBF SBBFH (HPM1 equivalent) SBBR SBBRH —Tapered type— Normal String eliminator type (S45C) SBGF SBGFH (HPM1 equivalent) SBGR SBGRH	20	30.0～200.0	0 10.5 11 12 13 16 20 21 23	3 3.5 4 4.5 5 5.5 6 6.5 7 8	2～4	D>V≧α+2 Available for tapered type only	1～10 Available for tapered type only
25			25						
30			30						

(*1) The value of α is set in accordance with L dimension.

Working limits

・**Straight type** D−α≧2 (Calculation of α value) $\alpha = P + 2\{L + (U) + 15\}\tan\frac{A}{2}$
・**Tapered type** V−α≧2 U : with ZC alteration

L−ℓ≧3 (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$

Conversion Chart of Trigonometric Functions P.1337

※0.25 is a value that takes G tolerance into account.

Order

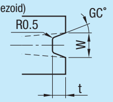
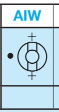
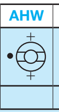
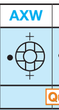
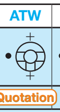
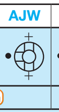
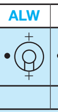
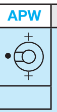
Part Number	—	L	—	SR	—	P	—	A	—	V	—	G
SBBF25	—	150.3	—	SR11	—	P3	—	A2				
SBGF25	—	100.0	—	SR16	—	P3.5	—	A2	—	V22.0	—	G8

Days to Ship Quotation

Price Quotation

Alterations

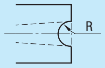
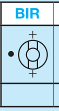
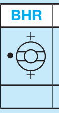
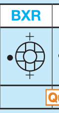
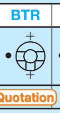
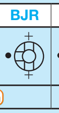
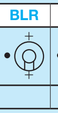
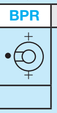
Part Number	—	L	—	SR	—	P	—	A	—	V	—	G	—	(AIW・BC···etc.)
SBGF25	—	100.0	—	SR16	—	P3.5	—	A2	—	V22.0	—	G5	—	AIW5—GC7—BC

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10—GC7 +Bolt hole position ・Dowel hole position (When NC, KP code is used)
	1Code	Quotation							

・W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

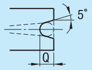
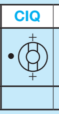
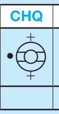
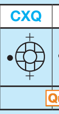
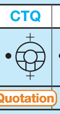
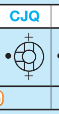
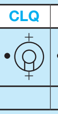
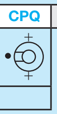
⊗ Combination with ZC not available.
⊗ Combination with RC not available.
ATW, AJW, ALW and APW have working limits as follows. (α−0.4)≧W
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4—GC7 "Specify in the sequence (shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position ・Dowel hole position (When NC, KP code is used)
	1Code	Quotation							

・R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

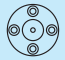
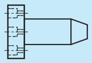
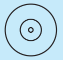
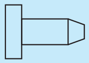
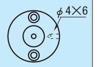
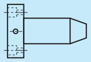
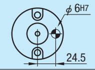
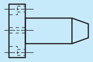
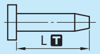
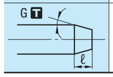
⊗ Combination with ZC not available.
⊗ Combination with RC not available.
BTR, BJR, BLR and BPR have working limits as follows. (α−0.4)≧2×R

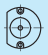
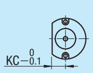
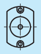
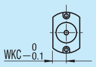
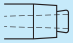
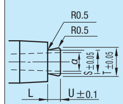
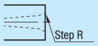
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position ・Dowel hole position (When NC, KP code is used)
	1Code	Quotation							

・Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

⊗ Combination with ZC not available
⊗ Combination with RC not available.
CTQ, CJQ, CLQ and CPQ have working limits as follows. (α−0.4)≧Q×1.09

Alterations	Code	Spec.		1Code
	BC		Increases No. of bolt holes. No. of bolt holes : 2 ···› 4 (Supplied bolts : 4) ⊗ Combination with NC not available.	Quotation
	BN		Decreases No. of bolt holes. No. of bolt holes : 2 ···› 0 (Supplied bolts : 0) M Available for equivalent of material HPM1	
 φ4×6	NC		Dowel hole boring ⊗ Not available for string eliminator type	
 φ6H7 24.5	KP		Dowel hole boring (longitudinal) ⊗ Not available for string eliminator type ⊗ Combination with NC not available. Available for equivalent of HPM1 only The effective length of dowel hole is 10mm below underhead part. (recessed hole φ6.5)	
 L T	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.		
 G T ℓ	GKC	Changes the G tolerance. $G^{0}_{-30'}$ ···› $G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.		

Alterations	Code	Spec.		1Code
	KC	 KC $^{0}_{-0.1}$	Single flange cutting KC=0.5mm increments D/2≦KC<25 ⊗ Combination with BC not available ⊗ Not available for string eliminator type ⊗ Combination with NC・KP not available Interference with the SR part may occur.	Quotation
	WKC	 WKC $^{0}_{-0.1}$	Two parallel flange cutting WKC=0.5mm increments D/2≦WKC<25 ⊗ Combination with BC not available ⊗ Not available for string eliminator type ⊗ Combination with NC・KP not available Interference with the SR part may occur.	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1	Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type D−α−(2×RC)>2 ・Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.		

HPM1
equivalent
SKD61

SPRUE BUSHINGS

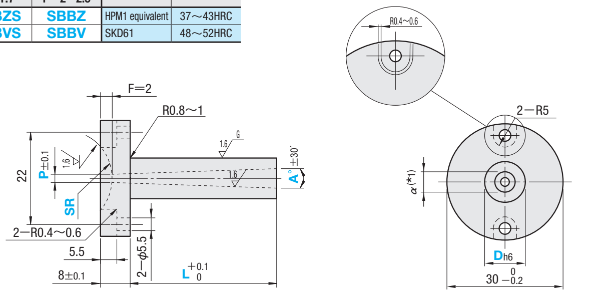
—NORMAL BOLT TYPE・FLANGE THICKNESS 8mm—

Sprue bushings —Normal bolt type・Flange thickness 8mm— are standardized for small molding machine of 15 ton or less. Use it when the entrance size is less than 150.

— Straight type —

Part Number		M	H
P=1.7	P=2・2.5		
SBBZS	SBBZ	HPM1 equivalent	37~43HRC
SBBVS	SBBV	SKD61	48~52HRC

RoHS

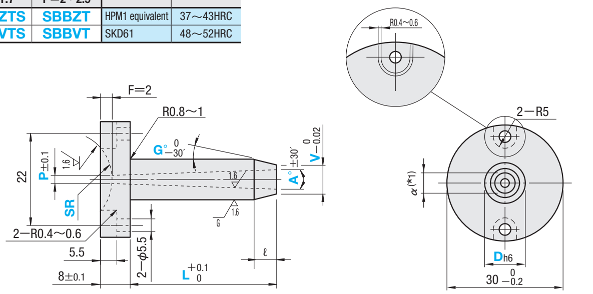


A CB5—12 (2 pcs.)

— Tapered type —

Part Number		M	H
P=1.7	P=2・2.5		
SBBZTS	SBBZT	HPM1 equivalent	37~43HRC
SBBVTS	SBBVT	SKD61	48~52HRC

RoHS



A CB5—12 (2 pcs.)

Dh6		Part Number				L(*2) 0.1mm increments	SR	P	A° 0.5° increments	V 0.1mm increments	G° 1° increments
		Type			D						
			When P=1.7	When P=2・2.5							
8	0 −0.009	—Straight type— (HPM1 equivalent) (SKD61)	SBBZS SBBVS	SBBZ SBBV	8	0~80.0	11	1.7(*4) 2 2.5	(*3) 1~4	D>V≧α+2 Available for tapered type only	1~10 Available for tapered type only
10		—Tapered type— (HPM1 equivalent) (SKD61)	SBBZTS SBBVTS	SBBZT SBBVT	10						

(*1) The value of α is set in accordance with L dimension.
(*2) L dimension is restricted by A.
(*3) L dimension limits

A	Lmax.
1	50

(*4) P=1.7 is applicable for A° 1, 2 only until L=40.

Working limits
- **Straight type** D−α≧2 (Calculation of α value) $\alpha=P+2(L+6)\tan\frac{A}{2}$
- **Tapered type** V−α≧2
  L−ℓ≧10 $\ell=\frac{D-V}{2\tan(G-0.25)}$

*0.25 is a value that takes G tolerance into account.
Please note that normal bolt 8mm thick flange type is to be L−ℓ≧10.

Conversion Chart of Trigonometric Functions P.1337
When using FC code
When FC1 $\alpha=P+2(L+7)\tan\frac{A}{2}$
When FC3 $\alpha=P+2(L+5)\tan\frac{A}{2}$

Order

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G
SBBV 10	—	50.0	—	SR11	—	P2	—	A2				
SBBVT10	—	50.0	—	SR11	—	P2	—	A2	—	V8	—	G6

Days to Ship Quotation

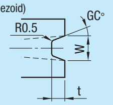
Non JIS material definition is listed on P.1351 - 1352

Price Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G	—	(AIW・AXW···etc.)	
SBBVT10	—	50.00	—	SR11	—	P2	—	A2	—	V8	—	G6	—	BXR2 —	LKC
SBBZ 10	—	40.1	—	SR11	—	P2	—	A2					—	FC1	

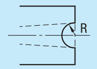
Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW4—GC7 +Bolt hole position KC position (When KC code is used)
	1Code	Quotation							

• W dimension and GC° selection

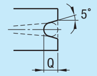
W	t	GC°
3	2.5	7° 10°
4	3	

ATW, AJW, ALW and APW have working limits of (α−0.6)≧W
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4—GC7 "Specify in the sequence (shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position KC position (When KC code is used)
	1Code	Quotation							

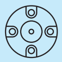
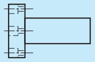
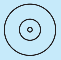
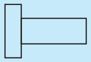
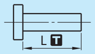
BTR, BJR, BLR and BPR have working limits of (α−0.6)≧2×R

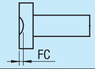
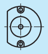
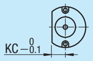
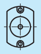
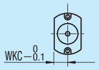
• R dimension selection
1
1.25
1.5
1.75
2
2.25
2.5
3

Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ3 +Bolt hole position KC position (When KC code is used)
	1Code	Quotation							

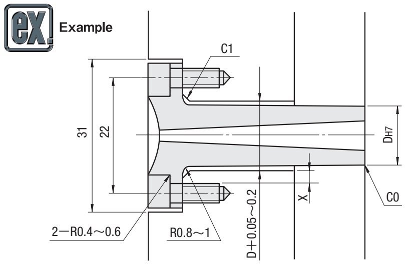
CTQ, CJQ, CLQ and CPQ have working limits (α−0.6)≧Q×1.09

• Q dimension selection
2
2.5
3

Alterations	Code	Spec.	1Code
	BC	 Increases No. of bolt holes. No. of bolt holes : 2 ···→ 4 (Supplied bolts : 4)	Quotation
	BN	 Decreases No. of bolt holes. No. of bolt holes : 2 ···→ 0 (Supplied bolts : 0) M Available for equivalent of material HPM1	
	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···→ $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used.	

Alterations	Code	Spec.	1Code
	FC	For the alteration of nozzle touch part (SR) depth FC1 and FC3 can be selected. Note that when you use the FC code, the method of calculating the α dimension changes.	Quotation
	KC	 Single flange cutting KC=0.5mm increments D/2≦KC<15 ⊗ Combination with BC not available Interference with the SR part may occur.	
	WKC	 Two parallel flange cutting WKC=0.5mm increments D/2≦WKC<15 ⊗ Combination with BC not available Interference with the SR part may occur.	

Example



[Example of hole machining and assembling for sprue bushing]

The position of sprue bushing hole and that of tap hole is adjacent. Please be careful when hole processing because the thickness of X dimension is thin.

■Recommended X Dimension

D	Xmm
8	4.4~4.475
10	3.4~3.475

To decrease the concentration of stress, R part is designed on the root of flange.

HPM1 equivalent
SKD61
DC53

SPRUE BUSHINGS

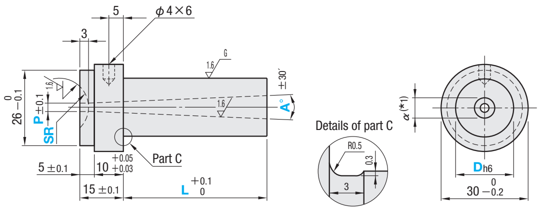
—SHOULDER TYPE—

Electroforming P.773　　Details of string eliminator (P.747)

— Straight type —

RoHS

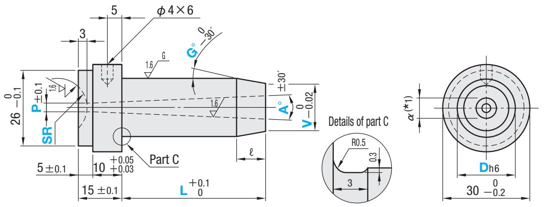
Part Number		M	H
Normal	String eliminator type		
SBSM	SBSMH	HPM1 equivalent	37~43HRC
SBSD	SBSDH	SKD61	48~52HRC
SBSS	SBSSH	DC53	58~62HRC



— Tapered type —

RoHS

Part Number		M	H
Normal	String eliminator type		
SBTM	SBTMH	HPM1 equivalent	37~43HRC
SBTD	SBTDH	SKD61	48~52HRC
SBTS	SBTSH	DC53	58~62HRC



Dh6		Part Number Type		D	(*2)L 0.1mm increments	SR	P	A° 0.5° increments	V 0.1mm increments	G° 1° increments
8	0 −0.009	—Straight type—		8(*5)	0~ 80.0	0 10.5 11	2 2.5 3 3.5	(*3) 0.5~3		
10		Normal	String eliminator type	10	(*7) 0~120.0	0 10.5	2(*3,4) 2.5(*3)			
12		(HPM1 equivalent) SBSM (SKD61) SBSD (DC53) SBSS	SBSMH SBSDH SBSSH	12		11	3(*3) 3.5		D>V≧α+2 Available for tapered type only	1~10 Available for tapered type only
13	0 −0.011	—Tapered type—		13	(*7) 0~150.0	12 13	4 4.5			
16		Normal	String eliminator type	16		16	5 5.5	(*3) 0.5~4		
20	0 −0.013	(HPM1 equivalent) SBTM (SKD61) SBTD	SBTMH SBTDH	20(*6)	(*7) 0~200.0	20(*4) 21(*4)	6 6.5			
25		(DC53) SBTS	SBTSH	25(*6)		23(*4)	7 8			

(*1) The value of α is set in accordance with L dimension.
(*2) L dimension is restricted by P, V and A.
Similarly, G is restricted by L dimension.
(*3) L dimension limits

P	2			2.5			3		3.5~4.5	
A	0.5	1	1.5~4.0	0.5	1	1.5~4.0	0.5	1~1.5	0.5	1~1.5
L dimension limit	30	50	85	45	50	85	60	85	60	150

(*4) Not available for products with string eliminator.
(*5) Available only for SBSM・SBSD
(*6) D20・25 cannot be designated for SBSS・SBSSH・SBTS・SBTSH
(*7) SBSS・SBSSH・SBTS・SBTSH can be designed up to L100.

Working limits　Conversion Chart of Trigonometric Functions P.1337

・**Straight type**
D−α≧2 (Calculation of α value) $\alpha = P + 2\{L + (U) + 12\}\tan\frac{A}{2}$

・**Tapered type**　U : with ZC alteration
V−α≧2
L−ℓ≧3 (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$
※0.25 is a value that takes G tolerance into account.

Order	Part Number	—	L	—	SR	—	P	—	A	—	V	—	G
	SBSD13	—	80.0	—	SR11	—	P3	—	A2				
	SBTM25	—	45.5	—	SR23	—	P4.5	—	A4	—	V20.0	—	G5

Days to Ship　Quotation

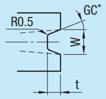
Non JIS material definition is listed on P.1351 - 1352

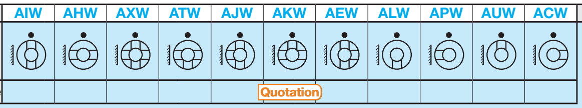
P Price　Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G	—	(AIW・AXW···etc.)
SBSMH25	—	45.5	—	SR16	—	P4.5	—	A4					—	AXW10—GC10—KC

Quotation



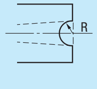


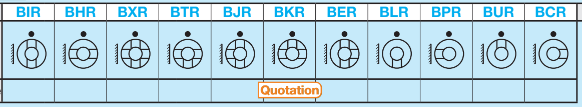
Alterations	Code	AIW	AHW	AXW	ATW	AJW	AKW	AEW	ALW	APW	AUW	ACW
Shape A (Trapezoid)	Spec.											
	1Code	Quotation										

Designation method AIW10—GC7
・Dowel hole position
KC position (When KC code is used)
Combination with ZC not available.
Combination with RC not available.
ATW, AJW, AKW, AEW, ALW APW, AUW and ACW have working limits as follows.
When D≦10, (α−0.6)≧W
When D≧12, (α−0.4)≧W
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4—GC7 "Specify in the sequence (shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Spec. ・W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

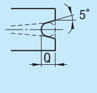


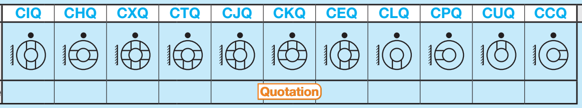


Alterations	Code	BIR	BHR	BXR	BTR	BJR	BKR	BER	BLR	BPR	BUR	BCR
Shape B (Semicircle)	Spec.											
	1Code	Quotation										

Designation method BXR2
・Dowel hole position
KC position (When KC code is used)
Combination with ZC not available.
Combination with RC not available.
BTR, BJR, BKR, BER, BLR, BPR, BUR and BCR have working limits as follows.
when D≦10, (α−0.6)≧2×R
when D≧12, (α−0.4)≧2×R

Spec. ・R dimension selection
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

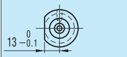
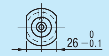
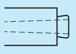
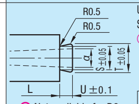


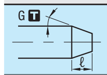
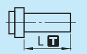
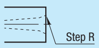


Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CKQ	CEQ	CLQ	CPQ	CUQ	CCQ
Shape C (Arc+Tangent)	Spec.											
	1Code	Quotation										

Designation method CTQ5
・Dowel hole position
KC position (When KC code is used)
Combination with ZC not available.
Combination with RC not available.
CTQ, CJQ, CKQ, CEQ, CLQ, CPQ, CUQ and CCQ have working limits as follows.
when D≦10, (α−0.6)≧Q×1.09
when D≧12, (α−0.4)≧Q×1.09

Spec. ・Q dimension selection
2
2.5
3
3.5
4
5
6
8

Alterations	Code	Spec.		1Code
	KC	 13 0 −0.1	Adds a key flat on the head.	Quotation
	WKC	 26 0 −0.1	Adds two parallel flats on the head.	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1 Not available for D8	Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	

Alterations	Code	Spec.	1Code
 G T ℓ	GKC	Changes the G tolerance. $G^{0}_{-30'}$ ···› $G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 Combination with ZC not available.	Quotation
 L T	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. Combination with ZC not available.	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1　2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type　D−α−(2×RC)>2 ・Tapered type　V−α−(2×RC)>2 Combination with shapes A, B and C not available. Combination with ZC not available.	

S45C
HPM1 equivalent
SKD61

SPRUE BUSHINGS

—OLD JIS B TYPE—

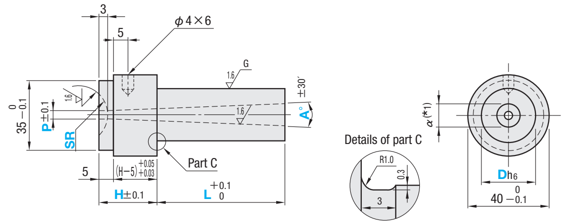
Electroforming P.773

Details of string eliminator (P.747)

— Straight type —

RoHS

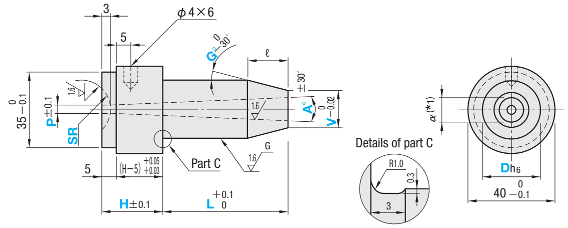
Part Number		M	H
Normal	String eliminator type		
SJBC	SJBCH	S45C	—
SJBM	SJBMH	HPM1 equivalent	37～43HRC
SJBD	SJBDH	SKD61	48～52HRC



— Tapered type —

RoHS

Part Number		M	H
Normal	String eliminator type		
SJTC	SJTCH	S45C	—
SJTM	SJTMH	HPM1 equivalent	37～43HRC
SJTD	SJTDH	SKD61	48～52HRC



Dh6		Part Number Type	D	H	L(*2) 0.1mm increments	SR	P	A° 0.5° increments	V 0.1mm increments	G° 1° increments
10	$^{0}_{-0.009}$	—Straight type— Normal / String eliminator type (S45C) SJBC SJBCH (HPM1 equivalent) SJBM SJBMH (SKD61) SJBD SJBDH —Tapered type— Normal / String eliminator type (S45C) SJTC SJTCH (HPM1 equivalent) SJTM SJTMH (SKD61) SJTD SJTDH	10	25	0～120.0	0 10.5 11 12 13 16 20 21	2(*3,4) 2.5(*3) 3(*3) 3.5 4 4.5 5	(*3) 1～4	D>V≧α+2 Available for tapered type only	1～10 Available for tapered type only
				30						
12	$^{0}_{-0.011}$		12	25	0～150.0					
				30						
13			13	25						
				30						
16			16	25						
				30						
20	$^{0}_{-0.013}$		20	25	0～200.0					
				30						

(*1) The value of α is set in accordance with L dimension.

(*2) L dimension is restricted by P, V and A.

(*3) L dimension limits

P	2		2.5		3	3.5～4.5
A	1	1.5～4.0	1	1.5～4.0	1～1.5	1～1.5
L dimension limit	50	85	50	85	85	150

(*4) Not available for products with string eliminator.

Working limits

Conversion Chart of Trigonometric Functions P.1337

- **Straight type**

D−α≧2 (Calculation of α value) $\alpha = P + 2\{L + (U) + H - 3\}\tan\frac{A}{2}$

U : with ZC alteration

- **Tapered type**

V−α≧2

L−ℓ≧3 (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$

※0.25 is a value that takes G tolerance into account.

Order	Part Number	—	H	—	L	—	SR	—	P	—	A	—	V	—	G
	SJBM16	—	25	—	42.0	—	SR12	—	P3.5	—	A3				
	SJTC 20	—	25	—	60.0	—	SR11	—	P3.5	—	A3	—	V16.0	—	G5

Days to Ship **Quotation**

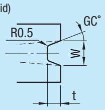
Non JIS material definition is listed on P.1351 - 1352

Price **Quotation**

Alterations

Part Number	—	H	—	L	—	SR	—	P	—	A	—	V	—	G	—	(AIW・AXW···etc.)
SJBCH20	—	25	—	60.01	—	SR11	—	P3.5	—	A3					—	LKC—KC—AIW10—GC10

Quotation

Alterations	Code	AIW	AHW	AXW	ATW	AJW	AKW	AEW	ALW	APW	AUW	ACW
Shape A (Trapezoid) 	Spec.											
	1Code	Quotation										

Spec.

• W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

Designation method AIW10—GC7

⊗ Combination with ZC not available.

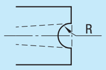
⊗ Combination with RC not available.

ATW, AJW, AKW, AEW, ALW APW, AUW and ACW have working limits as follows.
When D=10, (α−0.6)≧W
When D≧12, (α−0.4)≧W

• Dowel hole position
KC position (When KC code is used)

The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.

Designation method AHW4—GC7 "Specify in the sequence (shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BKR	BER	BLR	BPR	BUR	BCR
Shape B (Semicircle) 	Spec.											
	1Code	Quotation										

Spec.

• R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

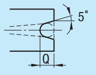
Designation method BXR2

⊗ Combination with ZC not available.

⊗ Combination with RC not available.

BTR, BJR, BKR, BER, BLR, BPR, BUR and BCR have working limits as follows.
when D=10, (α−0.6)≧2×R
when D≧12, (α−0.4)≧2×R

• Dowel hole position
KC position (When KC code is used)

Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CKQ	CEQ	CLQ	CPQ	CUQ	CCQ
Shape C (Arc+Tangent) 	Spec.											
	1Code	Quotation										

Spec.

• Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

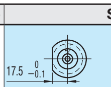
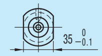
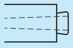
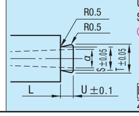
Designation method CTQ5

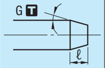
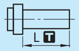
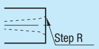
⊗ Combination with ZC not available.

⊗ Combination with RC not available.

CTQ, CJQ, CKQ, CEQ, CLQ, CPQ, CUQ and CCQ have working limits as follows.
when D=10, (α−0.6)≧Q×1.09
when D≧12, (α−0.4)≧Q×1.09

• Dowel hole position
KC position (When KC code is used)

Alterations	Code	Spec.	1Code
	KC	 17.5 $^{0}_{-0.1}$ Adds a key flat on the head.	Quotation
	WKC	 35 $^{0}_{-0.1}$ Adds two parallel flats on the head.	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	

Alterations	Code	Spec.	1Code
 G T ℓ	GKC	Changes the G tolerance. $G^{0}_{-30'} \cdots\to G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.	Quotation
 L T	LKC	L dimension tolerance alteration $L^{+0.1}_{0} \cdots\to L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 • Straight type D−α−(2×RC)>2 • Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

GUIDE FOR ELECTROFORMING SPRUE BUSHINGS

■Features of electroforming sprue bushing

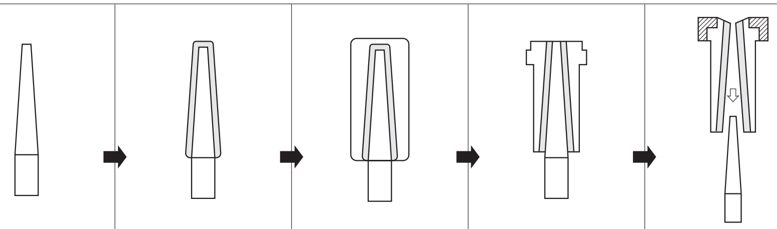
1. Sufficient mold-releasing ability	The surface roughness of the inside surface of an electroforming sprue bushing is finer than that of a steel sprue bushing. As a result, it is possible to separate the cooled and solidified sprue from the mold more smoothly. This is expected to be effective when using resin (e.g. acrylic resin, polycarbonate resin, etc.) that necessitates a high injection pressure to inject it into the mold.
2. Reduction of molding cycle time	An electroforming sprue bushing has good separation performance, so it is possible to reduce the draft angle (A°) of the sprue. By reducing the draft angle, the thickness of the sprue can be minimized, enabling the cooling time during the molding process to be reduced.
3. Excellent corrosion resistance	The raw material of the sprue is nickel alloy. This ensures that the sprue does not corrode when exposed to gas components emitted from the resin or moisture in the air.

Non JIS material definition is listed on P.1351 - 1352

■Method of manufacturing electroforming sprue bushings

1. A core rod (mother die) is manufactured with brass or other metals that can be processed easily.
2. Nickel alloy is deposited over the core rod by means of electro forming until the required thickness is obtained.
3. The external shape is formed by machining. The core rod is extracted, and finish processing is performed.

"Electroforming for this product is performed in a multi-stage process that enables the sprue bushing's internal surface to harden more for improved abrasion resistance, while making its external surface soft for better tenacity. "

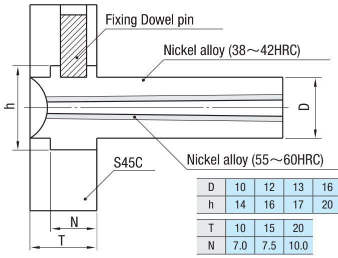


Core rod manufacturing (grinding and polishing)	Electroforming of the internal section (55～60HRC, 0.5mm or more in thickness) that comes into contact with sprue.	Additional electroforming until the required thickness is obtained (38～42HRC).	Machining to complete the external shape.	Extracting the core rod, followed by finishing processing. Finally, a flange (S45C) is attached.

■ Structure

Structure

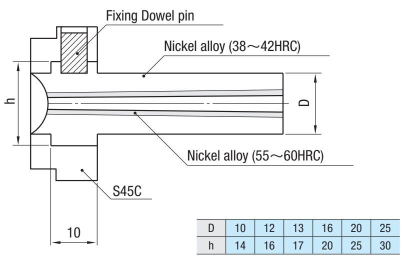
Bolt type



D	10	12	13	16	20	25
h	14	16	17	20	25	30

T	10	15	20
N	7.0	7.5	10.0

Shoulder type



D	10	12	13	16	20	25
h	14	16	17	20	25	30

- Although this sprue bushing's body and flange are made of different materials, they cannot be separated. Body : Nickel alloy (body's internal section: 55 60HRC; body's external section: 38 42HRC) and flange: S45C.
- When the size of attachment hole of metal mold is lager than size h, only dowel pin receives the nozzle pressure, which may cause any damage like the flange broken off the bushing. Moreover, please note that a similar trouble occurs when the chamfering of the attachment hole is lager than size h.
- Note that the sprue bushing will soften if exposed to heat for a long period. (Heat resistant 400℃)
- Use Steel Sprue Bushings instead when glass fiber resin or high hardness resin applied as the electroforming Spure Bushings are inferior to Steel Sprue Bushings in abrasion resistance.

Electroforming SPRUE BUSHINGS

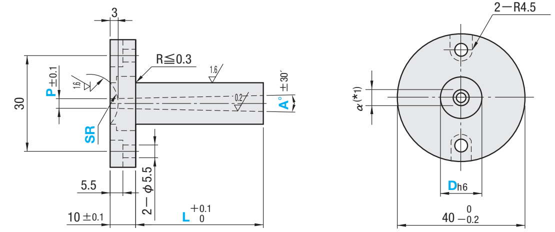
—NORMAL BOLT TYPE · FLANGE THICKNESS 10mm—

Details of electroforming sprue bushings P.771

—Straight type—

RoHS

Part Number	M			H
SBBN	Body	Nickel alloy	Inside (depth 0.5mm)	55~60HRC
			Outside	38~42HRC
	Head	S45C		—

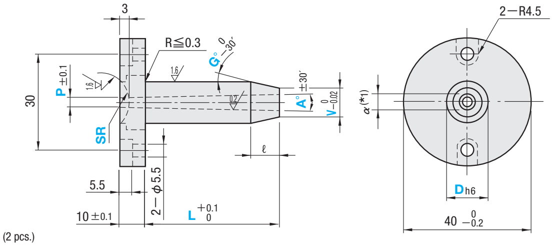


A CB5−12 (2 pcs.)

—Tapered type—

RoHS

Part Number	M			H
SBBNT	Body	Nickel alloy	Inside (depth 0.5mm)	55~60HRC
			Outside	38~42HRC
	Head	S45C		—



A CB5−12 (2 pcs.)

Dh6		Part Number Type	D	L 0.1mm increments	SR	P	A°	V 0.1mm increments	G° 1° increments
10	0 −0.009	—Straight type— **SBBN** (Nickel Alloy) —Tapered type— **SBBNT** (Nickel Alloy)	10	0~140.0	0 10.5 11 12 13 16 20 21 23	2 2.5 3 3.5 4 4.5 5	1 2 3(*2) 4(*3)	D>V≧α+2 Available for SBBNT only	1~10 Available for SBBNT only
12	0 −0.011		12						
13			13						
16			16	0~200.0					
20	0 −0.013		20						

(*1) The value of α is set in accordance with L dimension.
(*2) A° =3 will be available for maximum L dimension as 150
(*3) A° =4 is available for SBBN only, and L dimension is applicable until 120

Working limits

- **SBBN**

$D-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+7\}\tan\frac{A}{2}$

U : with ZC alteration

Conversion Chart of Trigonometric Functions P.1337

- **SBBNT**

$V-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+7\}\tan\frac{A}{2}$

U : with ZC alteration

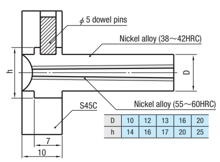
$L-\ell \geqq 3$ (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$

※ 0.25 is a value that takes G tolerance into account.

Order

Part Number	L	SR	P	A	V	G
SBBN 16	40.0	SR11	P3.5	A2		
SBBNT16	40.0	SR11	P3.5	A2	V12.0	G6

Days to Ship Quotation



D	10	12	13	16	20
h	14	16	17	20	25

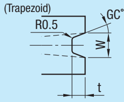
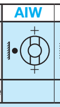
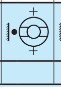
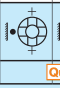
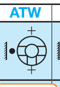
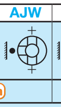
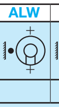
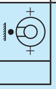
Please note that the body and head of bushing may come off when the dimension of the mold hole is larger than h value since all the nozzle pressure comes to the dowel pin. The similar trouble may occur when the chamfering of the hole is made larger than h value.

Non JIS material definition is listed on P.1351 - 1352

Price Quotation

Alterations

Part Number	L	SR	P	A	V	G	(AIW · AXW···etc.)
SBBN16	65.02	SR11	P3.5	A3			CTQ5 — LKC

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10−GC7 +Bolt hole position · Dowel hole position (When NC code is used) KC position (When KC code is used)
	1Code	Quotation							

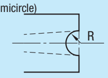
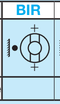
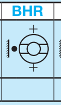
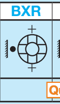
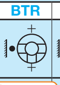
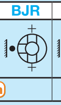
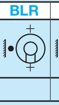
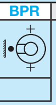
· W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

Combination with ZC not available.
Combination with RC not available.

ATW, AJW, ALW and APW have working limits as follows.
When D=10, $(\alpha-0.6)\geqq W$
When D≧12, $(\alpha-0.4)\geqq W$

The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4−GC7 Specify in the sequence "(shape) (W dimension)−GC°". If you do not make a specification, (AHW4, for example) will be 10°.

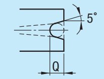
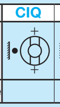
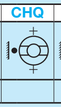
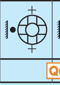
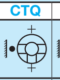
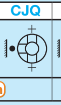
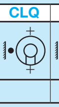
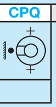
Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position · Dowel hole position (When NC code is used) KC position (When KC code is used)
	1Code	Quotation							

· R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

Combination with ZC not available.
Combination with RC not available.

BTR, BJR, BLR and BPR have working limits as follows.
when D=10, $(\alpha-0.6)\geqq 2\times R$
when D≧12, $(\alpha-0.4)\geqq 2\times R$

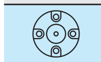
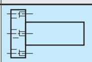
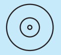
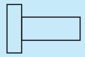
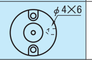
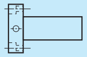
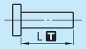
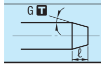
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position · Dowel hole position (When NC code is used) KC position (When KC code is used)
	1Code	Quotation							

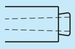
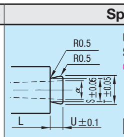
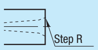
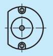
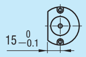
· Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

Combination with ZC not available
Combination with RC not available.

CTQ, CJQ, CLQ and CPQ have working limits as follows.
when D=10, $(\alpha-0.6)\geqq Q\times 1.09$
When D≧12, $(\alpha-0.4)\geqq Q\times 1.09$

Alterations	Code	Spec.		1Code
	**BC**		Increases No. of bolt holes. No. of bolt holes : 2 ···› 4 (Supplied bolts : 4) Combination with NC not available.	Quotation
	**BN**		Decreases No. of bolt holes. No. of bolt holes : 2 ···› 0 (Supplied bolts : 0)	
	**NC**		Dowel hole boring	
	**LKC**		Changes L dimension tolerance $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. Combination with ZC not available.	
	**GKC**		Changes the G tolerance. $G^{0}_{-30'}$ ···› $G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 Combination with ZC not available.	

Alterations	Code	Spec.		1Code
	**ZC**		Undercut machining S, T, U=0.1mm increments $S\geqq\alpha+2$ $\alpha+2\leqq T\leqq D(V-2U\tan G)$ $1.5\leqq U\leqq 5$ Specification L max.≧L+U Designation method ZC−S3.5−T4.0−U2.0	
	**RC**		The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 · Straight type D−α−(2×RC)>2 · Tapered type V−α−(2×RC)>2 Combination with shapes A, B and C not available. Combination with ZC not available.	Quotation
	**KC**		Adds a key flat on the flange. Combination with BC not available Combination with NC not available.	

Electroforming

SPRUE BUSHINGS

—NORMAL BOLT TYPE・FLANGE THICKNESS 15mm—

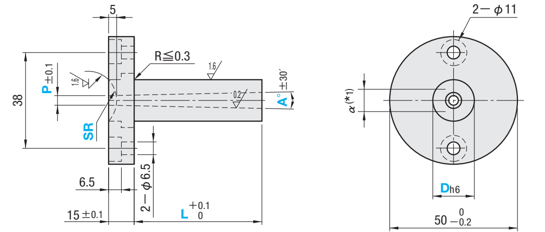
Details of electroforming sprue bushings P.771

Non JIS material definition is listed on P.1351 - 1352

—Straight type—

RoHS

Part Number			M	H
SBBE	Body	Nickel alloy	Inside (depth 0.5mm)	55～60HRC
			Outside	38～42HRC
	Head	S45C		—

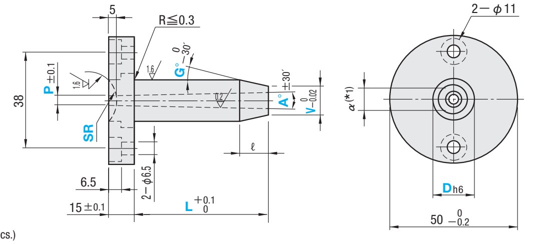


A CB6—15 (2 pcs.)

—Tapered type—

RoHS

Part Number			M	H
SBBET	Body	Nickel alloy	Inside (depth 0.5mm)	55～60HRC
			Outside	38～42HRC
	Head	S45C		—



A CB6—15 (2 pcs.)

Dh6		Part Number Type	D	L 0.1mm increments	SR	P	A°	V 0.1mm increments	G° 1° increments
10	0 −0.009	—Straight type— SBBE (Nickel Alloy) —Tapered type— SBBET (Nickel Alloy)	10	0～140.0	0 10.5 11 12 13 16 20 21 23	2 2.5 3 3.5 4 4.5 5	1 2 3(*2) 4(*3)	D>V≧α+2 Available for SBBET only	1～10 Available for SBBET only
12	0 −0.011		12						
13			13						
16			16	0～200.0					
20	0 −0.013		20						
25			25						

(*1) The value of α is set in accordance with L dimension.
(*2) A° =3 will be available for maximum L dimension as 150
(*3) A° =4 is available for SBBE only, and L dimension is applicable until 120

Working limits

・SBBE

D−α≧2 (Calculation of α value) $\alpha=P+2\{L+(U)+10\}\tan\frac{A}{2}$

U : with ZC alteration

Conversion Chart of Trigonometric Functions P.1337

・SBBET

V−α≧2 (Calculation of α value) $\alpha=P+2\{L+(U)+10\}\tan\frac{A}{2}$

U : with ZC alteration

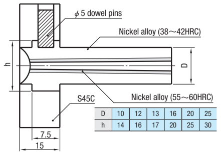
L−ℓ≧3 (Calculation of ℓ value) $\ell=\frac{D-V}{2\tan(G-0.25)}$

※ 0.25 is a value that takes G tolerance into account.

Order

Part Number	L	SR	P	A	V	G
SBBE 16	60.0	SR11	P3.5	A2		
SBBET16	60.0	SR11	P3.5	A2	V12.0	G6

Days to Ship Quotation



D	10	12	13	16	20	25
h	14	16	17	20	25	30

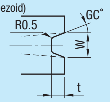
Please note that the body and head of bushing may come off when the dimension of the mold hole is larger than h value since all the nozzle pressure comes to the dowel pin. The similar trouble may occur when the chamfering of the hole is made larger than h value.

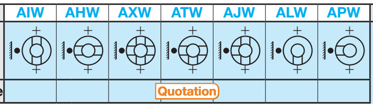
Price Quotation

Alterations

Part Number	L	SR	P	A	V	G	(AIW・AXW···etc.)
SBBE16	65.02	SR11	P3.5	A3			CTQ5 — LKC

Shape A (Trapezoid)





Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW
Shape A (Trapezoid)	Spec.							
	1Code	Quotation						

Spec.: Designation method AIW10—GC10
+Bolt hole position
・Dowel hole position (When NC code is used)
KC position (When KC code is used)

・W dimension and GC° selection

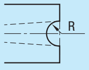
W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

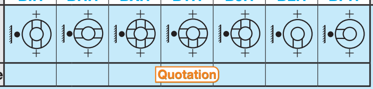
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

ATW, AJW, ALW and APW have working limits as follows.
when D=10, (α−0.6)≧W
when D≧12, (α−0.4)≧W

The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°. Designation method AHW4—GC7 "Specify in the sequence (shape) (W dimention)—GC°" "If you do not make a specification, (AHW4, for example) will be 10°".

Shape B (Semicircle)





Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR
Shape B (Semicircle)	Spec.							
	1Code	Quotation						

Spec.: Designation method BXR2
+Bolt hole position
・Dowel hole position (When NC code is used)
KC position (When KC code is used)

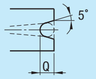
・R dimension selection

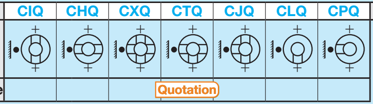
R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

⊗ Combination with ZC not available.
⊗ Combination with RC not available.

BTR, BJR, BLR and BPR have working limits as follows.
when D=10, (α−0.6)≧2×R
when D≧12, (α−0.4)≧2×R

Shape C (Arc+Tangent)





Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ
Shape C (Arc+Tangent)	Spec.							
	1Code	Quotation						

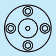
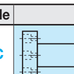
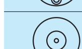
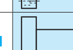
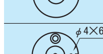
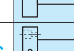
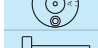
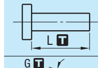
Spec.: Designation method CTQ5
+Bolt hole position
・Dowel hole position (When NC code is used)
KC position (When KC code is used)

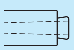
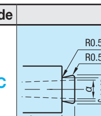
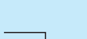
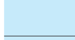
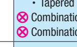
・Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

⊗ Combination with ZC not available
⊗ Combination with RC not available.

CTQ, CJQ, CLQ and CPQ have working limits as follows.
when D=10, (α−0.6)≧Q×1.09
when D≧12, (α−0.4)≧Q×1.09

Alterations	Code	Spec.	1Code
	BC	 Increases No. of bolt holes. No. of bolt holes : 2 ···→ 4 (Supplied bolts : 4) ⊗ Combination with NC not available.	Quotation
	BN	 Decreases No. of bolt holes. No. of bolt holes : 2 ···→ 0 (Supplied bolts : 0)	
 φ4×6	NC	 Dowel hole boring	
 L T	LKC	Changes L dimension tolerance $L^{+0.1}_{0}$ ···→ $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 G T ℓ	GKC	Changes the G tolerance. $G^{0}_{-30'}$ ···→ $G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.	

Alterations	Code	Spec.	1Code
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC—S3.5—T4.0—U2.0	Quotation
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type D−α−(2×RC)>2 ・Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	
	KC	 17.5 0 −0.1 Adds a key flat on the flange. ⊗ Combination with BC not available ⊗ Combination with NC not available.	

Electroforming

SPRUE BUSHINGS

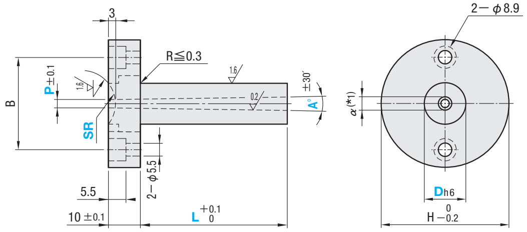
—OLD JIS A TYPE—

Details of electroforming sprue bushings P.771

—Straight type—

RoHS

Part Number	M			H
SBJE	Body	Nickel alloy	Inside (depth 0.5mm)	55~60HRC
			Outside	38~42HRC
	Head	S45C		—

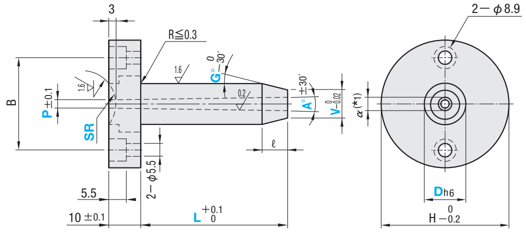


A CB5−12 (2 pcs.)

—Tapered type—

RoHS

Part Number	M			H
SBJET	Body	Nickel alloy	Inside (depth 0.5mm)	55~60HRC
			Outside	38~42HRC
	Head	S45C		—



A CB5−12 (2 pcs.)

H	B	Dh6		Part Number Type	D	L 0.1mm increments	SR	P	A°	V 0.1mm increments	G° 1° increments
35	25	10	0 −0.009	—Straight type— SBJE (Nickel Alloy) —Tapered type— SBJET (Nickel Alloy)	10	0~140.0	0 10.5 11 12 13	2 2.5 3 3.5 4 4.5 5	1 2 3(*2) 4(*3)	D>V≧α+2 Available for SBJET only	1~10 Available for SBJET only
		12	0 −0.011		12						
		13			13						
50	36	16			16	0~200.0	0 10.5 11 12 13 16				
		20	0 −0.013		20						
		25			25						

(*1) The value of α is set in accordance with L dimension.
(*2) A°=3 will be available for maximum L dimension as 150
(*3) A°=4 is available for SBJE only, and L dimension is applicable until 120

Working limits

- SBJE
  $D-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+7\}\tan\frac{A}{2}$
  U : with ZC alteration
- SBJET
  $V-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+7\}\tan\frac{A}{2}$
  U : with ZC alteration
  $L-\ell \geqq 3$ (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$

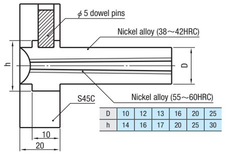
Conversion Chart of Trigonometric Functions P.1337

※ 0.25 is a value that takes G tolerance into account.

Order

Part Number	L	SR	P	A	V	G
SBJE 16	40.0	SR11	P3.5	A2		
SBJET16	40.0	SR11	P3.5	A2	V12.0	G6

Days to Ship Quotation



D	10	12	13	16	20	25
h	14	16	17	20	25	30

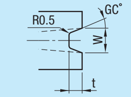
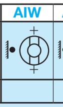
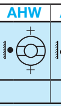
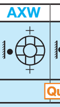
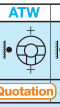
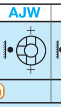
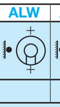
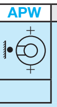
Please note that the body and head of bushing may come off when the dimension of the mold hole is larger than h value since all the nozzle pressure comes to the dowel pin. The similar trouble may occur when the chamfering of the hole is made larger than h value.

Non JIS material definition is listed on P.1351 - 1352

Price Quotation

Alterations

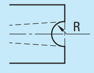
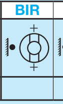
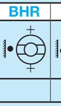
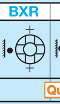
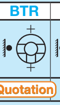
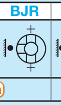
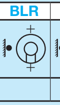
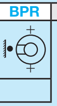
Part Number	L	SR	P	A	V	G	(AIW・AXW···etc.)
SBJET16	65.02	SR11	P3.5	A3	V12.0	G6	CTQ5 — LKC

Alterations	Code	AIW	AHW	AXW	ATW	AJW	ALW	APW	Spec.
Shape A (Trapezoid) 	Spec.								Designation method AIW10−GC10 +Bolt hole position ・Dowel hole position (When NC code is used) KC position (When KC code is used)
	1Code				Quotation				

・W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

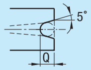
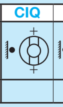
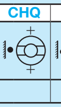
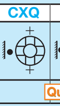
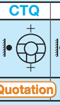
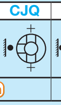
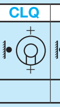
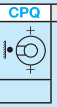
Combination with ZC not available.
Combination with RC not available.
ATW, AJW, ALW and APW have working limits as follows.
when D=10, (α−0.6)≧W
when D≧12, (α−0.4)≧W
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4−GC7 Specify in the sequence "(shape) (W dimension)−GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BLR	BPR	Spec.
Shape B (Semicircle) 	Spec.								Designation method BXR2 +Bolt hole position ・Dowel hole position (When NC code is used) KC position (When KC code is used)
	1Code				Quotation				

・R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

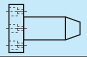
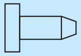
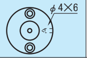
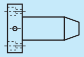
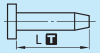
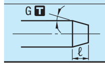
Combination with ZC not available.
Combination with RC not available.
BTR, BJR, BLR and BPR have working limits as follows.
when D=10, (α−0.6)≧2×R
when D≧12, (α−0.4)≧2×R

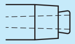
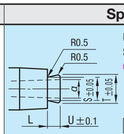
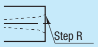
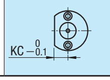
Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CLQ	CPQ	Spec.
Shape C (Arc+Tangent) 	Spec.								Designation method CTQ5 +Bolt hole position ・Dowel hole position (When NC code is used) KC position (When KC code is used)
	1Code				Quotation				

・Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

Combination with ZC not available
Combination with RC not available.
CTQ, CJQ, CLQ and CPQ have working limits as follows.
when D=10, (α−0.6)≧Q×1.09
when D≧12, (α−0.4)≧Q×1.09

Alterations	Code	Spec.	1Code
	BC	 Increases No. of bolt holes. No. of bolt holes : 2 ··· 4 (Supplied bolts : 4) Combination with NC not available.	Quotation
	BN	 Decreases No. of bolt holes. No. of bolt holes : 2 ··· 0 (Supplied bolts : 0)	
 ϕ4×6	NC	 Dowel hole boring	
 L T	LKC	Changes L dimension tolerance $L^{+0.1}_{0}$ ··· $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. Combination with ZC not available.	
 G T, ℓ	GKC	Changes the G tolerance. $G^{0}_{-30'}$ ··· $G^{0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 Combination with ZC not available.	

Alterations	Code	Spec.	1Code
	ZC	 R0.5, R0.5, α, S±0.05, T±0.05, L, U±0.1 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC−S3.5−T4.0−U2.0	Quotation
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Tapered type V−α−(2×RC)>2 ・Straight type D−α−(2×RC)>2 Combination with shapes A, B and C not available. Combination with ZC not available.	
	KC	 $KC^{0}_{-0.1}$ Adds a key flat on the flange. When D≦13, KC=9.5 When D≧16, KC=16 Combination with BC not available. Combination with NC not available.	

Electroforming

SPRUE BUSHINGS

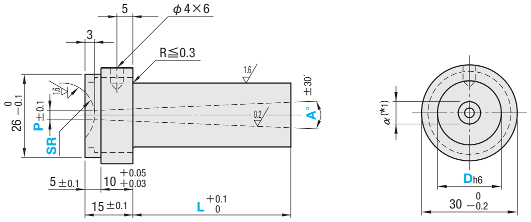
—SHOULDER TYPE—

Details of electroforming sprue bushings P.771

—Straight type—

RoHS

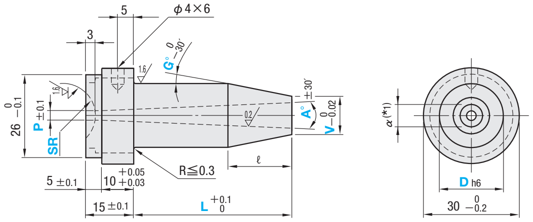
Part Number	M			H
SBSN	Body	Nickel alloy	Inside (depth 0.5mm)	55～60HRC
			Outside	38～42HRC
	Head	S45C		—



—Tapered type—

RoHS

Part Number	M			H
SBSNT	Body	Nickel alloy	Inside (depth 0.5mm)	55～60HRC
			Outside	38～42HRC
	Head	S45C		—



Dh6		Part Number Type	Part Number D	L 0.1mm increments	SR	P	A°	V 0.1mm increments	G° 1° increments
10	0 −0.009	—Straight type— **SBSN** (Nickel Alloy) —Tapered type— **SBSNT** (Nickel Alloy)	10	0～140.0	0 10.5 11 12 13 16 20 21 23	2 2.5 3 3.5 4 4.5 5	1 2 3(*2)	D>V≧α+2 Available for SBSNT only	1～10 Available for SBSNT only
12	0 −0.011		12						
13			13						
16			16	0～200.0					
20	0 −0.013		20						
25			25						

(*1)The value of α is set in accordance with L dimension.
(*2) A° =3 will be available for maximum L dimension as 150

Working limits

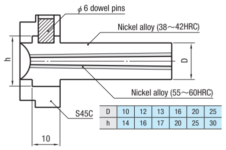
- **SBSN**
  $D-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+12\}\tan\frac{A}{2}$
  U : with ZC alteration
- **SBSNT**
  $V-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+\{L+(U)+12\}\tan\frac{A}{2}$
  U : with ZC alteration
  $L-\ell \geqq 3$ (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$
  ※ 0.25 is a value that takes G tolerance into account

Conversion Chart of Trigonometric Functions P.1337

Order

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G
SBSN 20	—	60.0	—	SR11	—	P3.5	—	A3				
SBSNT20	—	60.0	—	SR11	—	P3.5	—	A3	—	V16.0	—	G5

Days to Ship Quotation



D	10	12	13	16	20	25
h	14	16	17	20	25	30

Please note that the body and head of bushing may come off when the dimension of the mold hole is larger than h value since all the nozzle pressure comes to the dowel pin. The similar trouble may occur when the chamfering of the hole is made larger than h value.

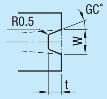
Non JIS material definition is listed on P.1351 - 1352

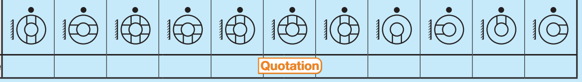
Price Quotation

Alterations

Part Number	—	L	—	SR	—	P	—	A	—	V	—	G	—	(AIW・AXW···etc.)
SBSNT16	—	55.0	—	SR11	—	P3.5	—	A2	—	V11.0	—	G10	—	CTQ3 — LKC

Shape A (Trapezoid)





Alterations	Code	AIW	AHW	AXW	ATW	AJW	AKW	AEW	ALW	APW	AUW	ACW
Shape A (Trapezoid)	1Code	Quotation										

Designation method AIW10—GC7

- Dowel hole position
- KC position (When KC code is used)

⊗ Combination with ZC not available.
⊗ Combination with RC not available.

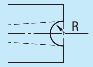
ATW, AJW, AKW, AEW, ALW APW, AUW and ACW have working limits as follows.
when D=10, (α −0.6)≧W
when D≧12, (α −0.4)≧W

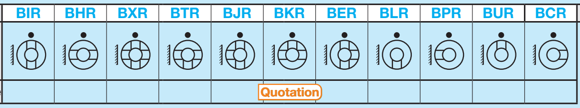
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

Spec. ・W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

Shape B (Semicircle)





Alterations	Code	BIR	BHR	BXR	BTR	BJR	BKR	BER	BLR	BPR	BUR	BCR
Shape B (Semicircle)	1Code	Quotation										

Designation method BXR2

- Dowel hole position
- KC position (When KC code is used)

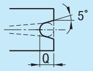
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

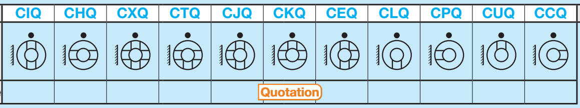
BTR, BJR, BKR, BER, BLR, BPR, BUR and BCR have working limits as follows.
when D=10, (α −0.6)≧2×R
when D≧12, (α −0.4)≧2×R

Spec. ・R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

Shape C (Arc+Tangent)





Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CKQ	CEQ	CLQ	CPQ	CUQ	CCQ
Shape C (Arc+Tangent)	1Code	Quotation										

Designation method CTQ5

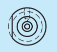
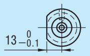
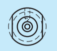
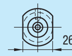
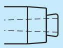
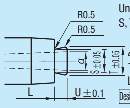
- Dowel hole position
- KC position (When KC code is used)

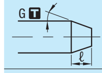
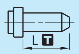
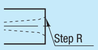
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

CTQ, CJQ, CKQ, CEQ, CLQ, CPQ, CUQ and CCQ have working limits as follows.
when D=10, (α −0.6)≧Q×1.09
when D≧12, (α −0.4)≧Q×1.09

Spec. ・Q dimension selection

Q
2
2.5
3
3.5
4
5
6
8

Alterations	Code	Spec.	1Code
	KC	 13 0 −0.1 Adds a key flat on the flange.	Quotation
	WKC	 26 0 −0.1 Adds two parallel flats on the head	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC−S3.5−T4.0−U2.0	

Alterations	Code	Spec.	1Code
 G T ℓ	GKC	Changes the G tolerance. $G^{\ 0}_{-30'}$ ⇢ $G^{\ 0}_{-15'}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.	Quotation
 L T	LKC	L dimension tolerance alteration $L^{+0.1}_{\ 0}$ ⇢ $L^{\ 0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type D−α−(2×RC)>2 ・Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

Electroforming SPRUE BUSHINGS

—OLD JIS B TYPE—

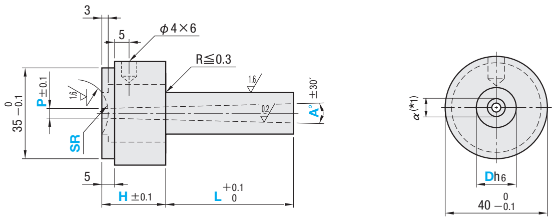
Details of electroforming sprue bushings P.771

Non JIS material definition is listed on P.1351 - 1352

—Straight type—

RoHS

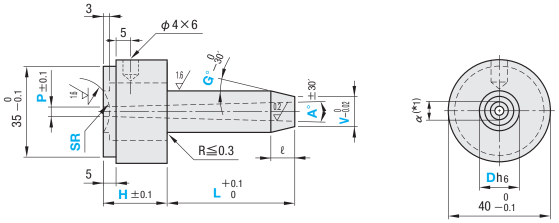
Part Number	M			H
SBJN	Body	Nickel alloy	Inside (depth 0.5mm)	55~60HRC
			Outside	38~42HRC
	Head	S45C		—



—Tapered type—

RoHS

Part Number	M			H
SBJNT	Body	Nickel alloy	Inside (depth 0.5mm)	55~60HRC
			Outside	38~42HRC
	Head	S45C		—



Dh6		Part Number Type	D	H	L 0.1mm increments	SR	P	A°	V 0.1mm increments	G° 1° increments
10	$^{\ 0}_{-0.009}$	—Straight type— SBJN (Nickel Alloy) —Tapered type— SBJNT (Nickel Alloy)	10	20 25 30	0~140.0	0 10.5 11 12 13 16 20 21	2 2.5 3 3.5 4 4.5 5	1 2 3(*2)	D>V≧α+2 Available for SBJNT only	1~10 Available for SBJNT only
12	$^{\ 0}_{-0.011}$		12							
13			13							
16			16		0~200.0					
20	$^{\ 0}_{-0.013}$		20							
25			25							

(*1) The value of α is set in accordance with L dimension.

(*2) A° =3 will be available for maximum L dimension as 150

Working limits

- SBJN
  $D-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+H-3\}\tan\frac{A}{2}$
  U : with ZC alteration
- SBJNT
  $V-\alpha \geqq 2$ (Calculation of α value) $\alpha = P+2\{L+(U)+H-3\}\tan\frac{A}{2}$
  U : with ZC alteration
  $L-\ell \geqq 3$ (Calculation of ℓ value) $\ell = \frac{D-V}{2\tan(G-0.25)}$

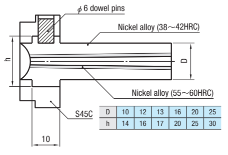
※ 0.25 is a value that takes G tolerance into account.

Conversion Chart of Trigonometric Functions P.1337

Order

Part Number	H	L	SR	P	A	V	G
SBJN 16	20	55.0	SR11	P3.5	A2		
SBJNT16	20	55.0	SR11	P3.5	A2	V12.0	G5

Days to Ship Quotation



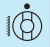
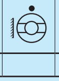
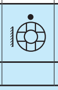
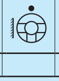
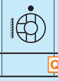
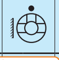
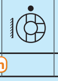
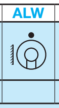
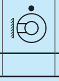
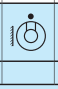
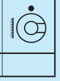
D	10	12	13	16	20	25
h	14	16	17	20	25	30

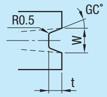
Please note that the body and head of bushing may come off when the dimension of the mold hole is larger than h value since all the nozzle pressure comes to the dowel pin. The similar trouble may occur when the chamfering of the hole is made larger than h value.

Price Quotation

Alterations

Part Number	H	L	SR	P	A	V	G	(AIW・AHW···etc.)
SBJNT16	20	55.0	SR11	P3.5	A2	V11.0	G10	CTQ3

Alterations	Code	AIW	AHW	AXW	ATW	AJW	AKW	AEW	ALW	APW	AUW	ACW
Shape A (Trapezoid)	Spec.											
	1Code						Quotation					



Designation method AIW10—GC10

- Dowel hole position
- KC position (When KC code is used)

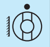
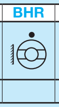
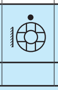
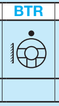
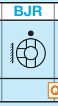
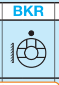
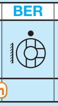
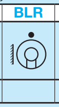
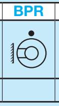
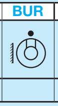
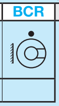
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

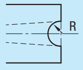
ATW, AJW, AKW, AEW, ALW APW, AUW and ACW have working limits as follows.
When D=10, (α −0.6)≧W
When D≧12, (α −0.4)≧W

The trapezoidal taper angle, which was previously fixed at 10° , is now selectable from 10° and 7° .
Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC° ". If you do not make a specification, (AHW4, for example) will be 10° .

Spec.
・W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

Alterations	Code	BIR	BHR	BXR	BTR	BJR	BKR	BER	BLR	BPR	BUR	BCR
Shape B (Semicircle)	Spec.											
	1Code						Quotation					



Designation method BXR2

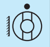
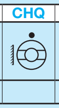
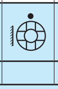
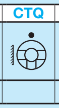
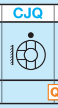
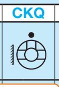
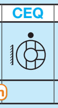
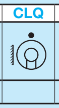
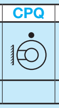
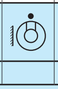
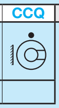
- Dowel hole position
- KC position (When KC code is used)

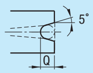
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

BTR, BJR, BKR, BER, BLR, BPR, BUR and BCR have working limits as follows.
when D=10, (α −0.6)≧2×R
when D≧12, (α −0.4)≧2×R

Spec.
・R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

Alterations	Code	CIQ	CHQ	CXQ	CTQ	CJQ	CKQ	CEQ	CLQ	CPQ	CUQ	CCQ
Shape C (Arc+Tangent)	Spec.											
	1Code						Quotation					



Designation method CTQ5

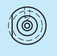
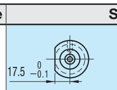
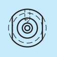
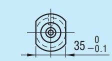
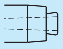
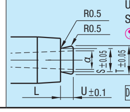
- Dowel hole position
- KC position (When KC code is used)

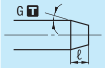
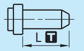
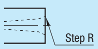
⊗ Combination with ZC not available.
⊗ Combination with RC not available.

CTQ, CJQ, CKQ, CEQ, CLQ, CPQ, CUQ and CCQ have working limits as follows.
when D=10, (α −0.6)≧Q×1.09
when D≧12, (α −0.4)≧Q×1.09

Spec.
・Q dimension selection

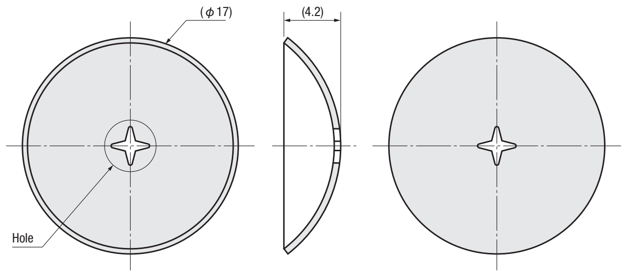
Q
2
2.5
3
3.5
4
5
6
8

Alterations	Code	Spec.	1Code
	KC	 $17.5^{\ 0}_{-0.1}$ Adds a key flat on the flange.	Quotation
	WKC	 $35^{\ 0}_{-0.1}$ Adds two parallel flats on the head	
	ZC	 R0.5 R0.5 α S±0.05 T±0.05 L U±0.1 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 L max.≧L+U Designation method ZC−S3.5−T4.0−U2.0	

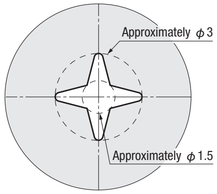
Alterations	Code	Spec.	1Code
 G T ℓ	GKC	Changes the G tolerance. $G^{\ 0}_{-30′}$ ··· $G^{\ 0}_{-15′}$ Available for tapered type when ℓ≦15 and (L−ℓ)≧10 ⊗ Combination with ZC not available.	Quotation
 L T	LKC	L dimension tolerance alteration $L^{+0.1}_{\ 0}$ ··· $L^{\ 0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. ⊗ Combination with ZC not available.	
 Step R	RC	The step R is processed in the tip bore to prevent the connection between the sprue and the runner from breaking when releasing from the mold. Dimension selection of step R: 1, 2 The step R is cut with an inner R cutter. Surface roughness and position precision are not provided. Available for α≧5 ・Straight type D−α−(2×RC)>2 ・Tapered type V−α−(2×RC)>2 ⊗ Combination with shapes A, B and C not available. ⊗ Combination with ZC not available.	

THREAD PREVENT CAPS

M－SK2



Details of the hole


Approximately φ3
Approximately φ1.5

M Stainless Steel
A Special double-faced tape

Part Number	10 in one set	
	U/Price	Slide Unit Price
	1～5 Set	6～10 Set
M－SK2	Quotation	

※10 items come in one set. They are not sold separately.

☎ Order

Part Number
M－SK2

Days to Ship **Quotation**

■Characteristics

- This product prevents sprue threads that occur during molding. (The effect varies by resin.)
- Pressure loss of injection pressure is small and that allows stable molding.
- Easy to mount even when threads occur during a molding trial or after prototyping, because this is a different part from sprue and a nozzle.
- This thin plate easily fits nozzle SR when it is held between the sprue and the nozzle. (Recommended sprue: SR10.5～13, P dimension: 3 and smaller)

■Notes

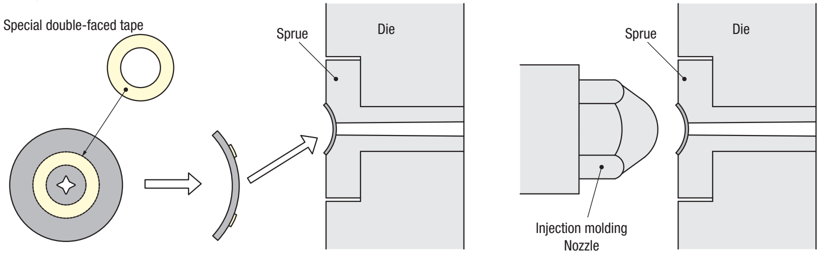
- If you use glass fiber, the hole may wear with use and that may weaken thread prevention effect.
- The cap may come off if you move the nozzle off because the cap is held between the nozzle and the sprue.

ex Example

① Apply the special double-faced tape on the surface (convex side) of the thread prevent cap.

② Attach the cap temporarily to sprue SR.

③ Press the nozzle against the sprue.


Special double-faced tape
Sprue
Die
Sprue
Die
Injection molding
Nozzle

HPM1 equivalent SKD61

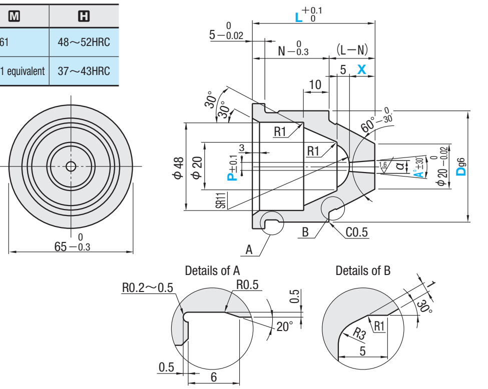
SPRUE BUSHINGS FOR EXTENSION NOZZLE

—LOCATING PRESSER TYPE—

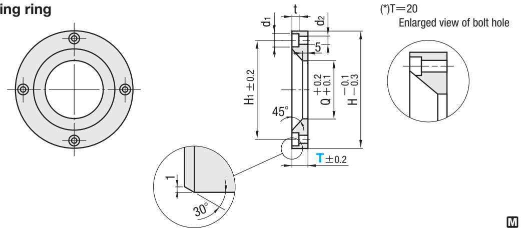
Non JIS material definition is listed on P.1351 - 1352

Enlarged view of recess

Part Number	M	H
SXHD	SKD61	48～52HRC
SXHM	HPM1 equivalent	37～43HRC


L +0.1 0
5 0 −0.02
N 0 −0.3
(L−N)
5 X
10
30°
30°
R1
R1
60° 0 −30
3
φ48
φ20
P±0.1
SR11
A±30'
α
φ20 0 −0.02
Dg6
65 0 −0.3
A
B
C0.5
Details of A
R0.2～0.5
R0.5
0.5
20°
0.5
6
Details of B
R3
R1
30°
5

Attached Locating ring


(*)T=20
Enlarged view of bolt hole
t
d1
d2
5
H1 ±0.2
Q +0.2 +0.1
H −0.1 −0.3
45°
T±0.2
1
30°

RoHS

M S45C

Dg6		N	(L−N)	Part Number Type	D	L	P	A° 1° increments	X	T
60	−0.010 −0.029	20	15	SXHD (SKD61) SXHM (HPM1 equivalent)	60	35	2.5	1～6	10 15	15 20(*)
		25	15			40	3			
		25	20			45	3.5			
		30	20			50	4			
		30	25			55	5			
		40	25			65				

*In the case of the T dimension 20 locating ring, the taper interferes with the bolt counterbore part.

Conversion Chart of Trigonometric Functions **P.1337**

Calculation of α value $\alpha = P + 2X\tan\frac{A}{2}$

■Attached Locating ring

Applicable bolts	Bolt hole			H_1	H	T	Q
	d_2	d_1	t				
M6	6.6	11	6.5	85	100	15 20	50

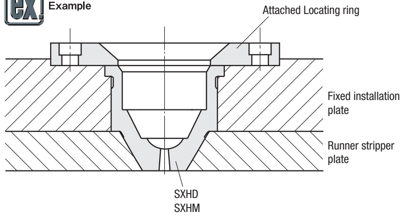
☎ Order

Part Number	—	L	—	P	—	A	—	X	—	T
SXHD60	—	55	—	P4	—	A4	—	X15	—	T20

Days to Ship **Quotation**

Each of these bushings comes with a locating ring as a set. When ordering, be sure to select the T dimension (thickness of the locating ring).

ex Example


Attached Locating ring
Fixed installation plate
Runner stripper plate
SXHD
SXHM

HPM1
equivalent
SKD61

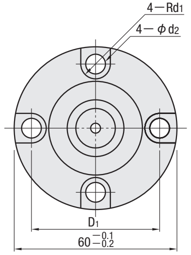
SPRUE BUSHINGS FOR EXTENSION NOZZLE

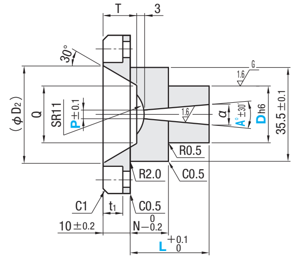
Non JIS material definition is listed on P.1351 - 1352

—Straight type—

RoHS

Part Number			M	H
Small nozzle type	Large nozzle type	Special nozzle type		
SXM	SXDM	SXCM	HPM1 equivalent	37〜43HRC
SXD	SXDD	SXCD	SKD61	48〜52HRC

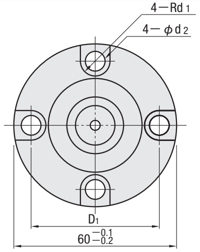


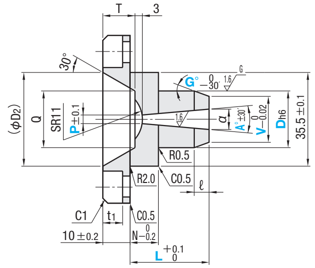


—Tapered type—

RoHS

Part Number			M	H
Small nozzle type	Large nozzle type	Special nozzle type		
SXTM	SXGM	SXSM	HPM1 equivalent	37〜43HRC
SXTD	SXGD	SXSD	SKD61	48〜52HRC





d1	d2	t1	D1	D2	T	N	Q	Part Number			L	P	A°	V	G°
								Type		D	0.1mm increments	0.1mm increments		0.1mm increments	1° increments
4.5	5.5	5.5	50	40	17	15	20	—Small nozzle type—		10	Straight type 25.0〜65.0 Tapered type 30.0〜65.0	2.0〜5.0	1 2 3 4	D>V≧α+4 Available for tapered type only	1〜10 Available for tapered type only
								Straight	Tapered	13					
								(HPM1 equivalent) SXM	SXTM	16					
								(SKD61) SXD	SXTD	20					
5.5	6.5	6.5	49	34	12	11	20	—Large nozzle type—		10	Straight type 21.0〜61.0 Tapered type 26.0〜61.0				
								Straight	Tapered	13					
								(HPM1 equivalent) SXDM	SXGM	16					
								(SKD61) SXDD	SXGD	20					
				38			24	—Special nozzle type—		10					
								Straight	Tapered	13					
								(HPM1 equivalent) SXCM	SXSM	16					
								(SKD61) SXCD	SXSD	20					

The value of α is set in accordance with L dimension.

*Available for tapered type only
L−(N+ℓ)≧4
(Calculation of ℓ value) $\ell=\frac{D-V}{2\tan(G-0.25)}$
※0.25 is a value that takes G tolerance into account.

Working limits
- SXM・SXD
  D−α≧2 (Calculation of α value) $\alpha=P+2\{L+(U)-10\}\tan\frac{A}{2}$
  U : with ZC alteration
- SXTM・SXTD
  V−α≧4 (Calculation of α value) $\alpha=P+2\{L+(U)-10\}\tan\frac{A}{2}$
  U : with ZC alteration

Conversion Chart of Trigonometric Functions P.1337
- SXDM・SXDD・SXCM・SXCD
  D−α≧2 (Calculation of α value) $\alpha=P+2\{L+(U)-5\}\tan\frac{A}{2}$
  U : with ZC alteration
- SXGM・SXGD・SXSM・SXSD
  V−α≧4 (Calculation of α value) $\alpha=P+2\{L+(U)-5\}\tan\frac{A}{2}$
  U : with ZC alteration

Order

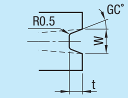
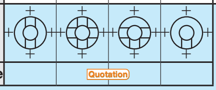
Part Number	L	P	A	V	G
SXM 13	63.5	P3.5	A2		
SXTM13	40.0	P3.0	A2	V11.0	G5

Days to Ship Quotation

Price Quotation

Alterations

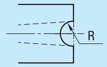
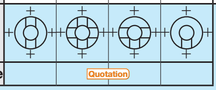
Part Number	L	P	A	V	G	(AIW・AXW···etc.)
SXM16	35.0	P3.5	A2			AIW6 — GC7 — LKC

Alterations	Code	AIW	AXW	ATW	ALW	Spec.
Shape A (Trapezoid) 	Spec.					Designation method AIW10—GC7 +Bolt hole position Combination with ZC not available. ATW, ALW have working limits as follows. When D=10, (α−0.6)≧W When D≧13, (α−0.4)≧W
	1Code	Quotation				

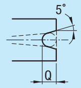
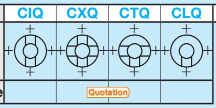
• W dimension and GC° selection

W	t	GC°
3	2.5	7°
4	3	
5	3.5	
6	4	10°
8	5.5	
10	7	

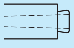
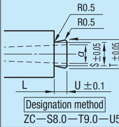
The trapezoidal taper angle, which was previously fixed at 10°, is now selectable from 10° and 7°.
Designation method AHW4—GC7 Specify in the sequence "(shape) (W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.

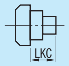
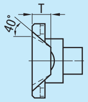
Alterations	Code	BIR	BXR	BTR	BLR	Spec.
Shape B (Semicircle) 	Spec.					Designation method BXR2 +Bolt hole position Combination with ZC not available. BTR, BLR have working limits as follows. when D=10, (α−0.6)≧2×R when D≧13, (α−0.4)≧2×R
	1Code	Quotation				

• R dimension selection
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

Alterations	Code	CIQ	CXQ	CTQ	CLQ	Spec.
Shape C (Arc+Tangent) 	Spec.					Designation method CTQ5 +Bolt hole position Combination with ZC not available. CTQ, CLQ have working limits as follows. when D=10, (α−0.6)≧Q×1.09 when D≧13, (α−0.4)≧Q×1.09
	1Code	Quotation				

• Q dimension selection
2
2.5
3
3.5
4
5
6
8

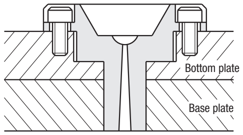
Alterations	Code	Spec.	1Code
	ZC	 Undercut machining S, T, U=0.1mm increments S≧α+2 α+2≦T≦D(V−2UtanG) 1.5≦U≦5 Specification L max.=65.0 ···› L+U≦65.0 Specification L max.=61.0 ···› L+U≦61.0 Designation method ZC—S8.0—T9.0—U5.0	Quotation

Alterations	Code	Spec.	1Code
	LKC	L dimension tolerance alteration $L^{+0.1}_{0}$ ···› $L^{0}_{-0.02}$ L dimension can be designated at 0.01mm increments when LKC is used. Combination with ZC not available.	Quotation
	TFC	The T dimension taper angle will be changed. 30° (±30′) ···› 40° (±30′) Available only for large nozzle type The tapering will interfere with the bolt counterbore.	

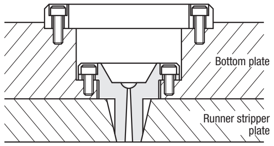
Example

Since the sprue length can be cut shorter than other sprue bushings, the resin can be saved.

(1) Functions as a locating ring + sprue bushing



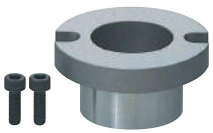
(2) Use in combination with **LRBS** bolt type locating ring

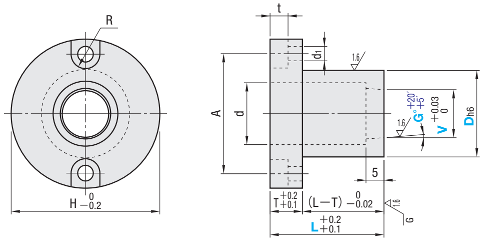


SPRUE BUSHING GUIDES

RoHS

SBGN





G Dimension Tolerance $^{+10'}_{0}$ has been changed to $^{+20'}_{+5'}$.
※There is a straight part about 0.1 to 0.5 on the end of the V dimension part.

M SUJ 2
H 55HRC～
A Bolt (2 pcs.)

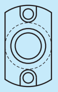
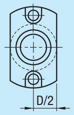
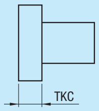
Appl. sprue bushing dia.	H	A	d	Supplied bolts	d1	R	t	T	Part Number		L	V	G°	U/Price
									Type	D		0.1mm increments	1° increments	1～4
10	32	24	11	M4×12	4.5	4	5	8	SBGN	16	15 20 25 30	6.0～ 9.0	1～10	Quotation
13	36	28	14							20		9.0～12.0		
16	42	34	17							25		12.0～15.0		
20	48	38	21	M5×15	5.5	5	6	10		28	20 25 30	16.0～19.0		
25	55	45	26							35	25 30 35 40	21.0～24.0		
30	60	50	31							40		26.0～29.0		

Order Part Number — L — V — G
SBGN25 — 20 — V14.0 — G5

Days to Ship Quotation

Price Quotation

Alterations Part Number — L — V — G — (WKC · TKC)
SBGN20 — 20 — V11.0 — G5 — WKC

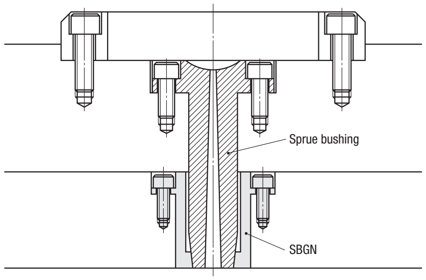
Alterations	Code	Spec.	1Code
	WKC	 D/2 Adds two parallel flats on the head	Quotation
 TKC	TKC	T $^{+0.2}_{+0.1}$ ···› T $^{0}_{-0.02}$ Changes the head thickness tolerance from $^{+0.2}_{+0.1}$ to $^{0}_{-0.02}$ The L dimension tolerance (L) becomes $^{0}_{-0.05}$	

■Precautions for use

When assembling the sprue bushing guide and the sprue bushing, adjust the end faces of both of the actual products and then fix them in place.
The angle tolerance of the bore taper of the sprue bushing guide is controlled within the range of +5´ to +20´, however matching with the separately manufactured sprue bushing is not carried out, so be sure to adjust of the actual products before usage.

Example

- By using this product, tapering to the runner stripper plate will be unnecessary. It will only be necessary to machine round holes, so the machining will become easy.

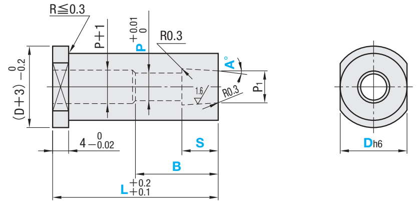


SPRUE LOCK BUSHINGS

Non JIS material definition is listed on P.1351 - 1352

—Head type— RoHS

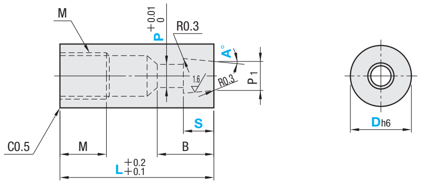
SLBH (B dimension selection type)
SLBF (B dimension designation type)



M SKD61
H 48~52HRC

—Straight type— RoHS

SLBS (B dimension selection type)



M SKD61
H 48~52HRC

■Head type, B dimension selected

P_1	B	Part Number Type	D	L	P	S 0.1mm increments	A°	U/Price 1~4
3.5	12	SLBH	8	20 25 30 35 40 50	3	3.0~ 7.0	0 1 2 3 4 5	Quotation
4.6	13		10		4	3.0~ 8.0		
5.8	14		13	20 25 30 35 40 50 60	5	3.0~ 9.0		
6.8	18				6	3.0~10.0		
9	20		16	25 30 35 40 50 60	8	3.0~12.0		

■Head type, B dimension designated

P_1	Part Number Type	D	L	P	S 0.1mm increments	B 1mm increments	A°	U/Price 1~4
3.5	SLBF	8	20 25 30 35 40 50	3	3.0~ 7.0	12~20	0 1 2 3 4	Quotation
4.6		10		4	3.0~ 8.0	13~20		
5.8		13	20 25 30 35 40 50 60	5	3.0~ 9.0	14~25		
6.8				6	3.0~10.0	18~30		
9		16	25 30 35 40 50 60	8	3.0~12.0	20~30		

■Straight type, B dimension selected

P_1	B	M	Part Number Type	D	L	P	S 0.1mm increments	A°	U/Price 1~4
3.5	12	8	SLBS	13	25	3	3.0~ 7.0	0 1 2 3 4 5	Quotation
4.6	13	10				4	3.0~ 8.0		
5.8	14	12		16	30	5	3.0~ 9.0		
6.8	18	12			35	6	3.0~10.0		
9	20	16		20	40	8	3.0~12.0		

Order

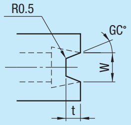
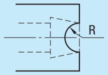
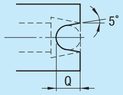
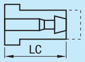
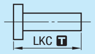
Part Number		L		P		S		B		A
SLBF10	—	40	—	P4	—	S3.0	—	B16	—	A2
SLBS13	—	25	—	P3	—	S6.2			—	A2

Days to Ship Quotation

Price Quotation

Alterations

Part Number		L(LC)		P		S		B		A		(AIW · BXR · LKC···etc.)
SLBS13	—	LC24	—	P3	—	S6.2			—	A2	—	BXR3

Alterations	Code	Spec.	Code	Spec.	Code	Spec.	Spec.	1Code
Shape A (Trapezoid)  R0.5 GC° W t	AIW		AHW		AXW		Designation method AIW4—GC7	Quotation
	ATW		AJW				▨ Key flat position ATW, AJW, ALW and APW have working limits as follows. When D≦10, (P_1—0.6)≧W When D≧13, (P_1—0.4)≧W D8 is available for AIW · AHW · AXW only. The trapezoidal taper angle, which was previously fixed at 10B, is now selectable from 10B and 7B. Designation method AHW4—GC7 Specify in the sequence "(shape)(W dimension)—GC°". If you do not make a specification, (AHW4, for example) will be 10°.	
	ALW		APW					
Shape B (Semicircle)  R	BIR		BHR		BXR		Designation method BXR2	
	BTR		BJR				▨ Key flat position BTR, BJR, BLR and BPR have working limits as follows. when D≦10, (P_1—0.6)≧2×R when D≧13, (P_1—0.4)≧2×R	
	BLR		BPR					
Shape C (Arc+Tangent)  5° Q	CIQ		CHQ		CXQ		Designation method CTQ5	
	CTQ		CJQ				▨ Key flat position CTQ, CJQ, CLQ and CPQ have working limits as follows. when D≦10, (P_1—0.6)≧Q×1.09 when D≧13, (P_1—0.4)≧Q×1.09	
	CLQ		CPQ					
 LC	LC	Full length alteration 15≦LC<L 0.1mm increments B of SLBH and SLBS becomes shorter by (L—LC). B—S≧1 All of dimensions SLBF remain unchanged.						
 LKC T	LKC	$L^{+0.2}_{+0.1}$ ···› $L^{0}_{-0.02}$ When combination with LC, LC alteration in 0.01mm increments possible.						

• W dimension and GC° selection

W	t	GC°
3	2.5	7° 10°
4	3	
5	3.5	
6	4	
8	5.5	

• R dimension selection

R
1
1.25
1.5
1.75
2
2.25
2.5
3
3.5
4

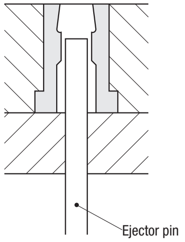
• Q dimension selection

Q
2
2.5
3
3.5
4
5
6

▨ indicates the key flat position when SLBH and SLBF are used.

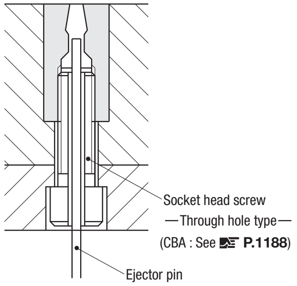
Example

Head type
(SLBH · SLBF)



Select the L dimension in accordance with the die plate thickness.

Straight type
SLBS



Can be used regardless of the die plate thickness. This product is particularly suited for thick plates. To mount this sprue lock bushing, use a through hole type socket head screw (CBA) by adjusting ejector pin's diameter.

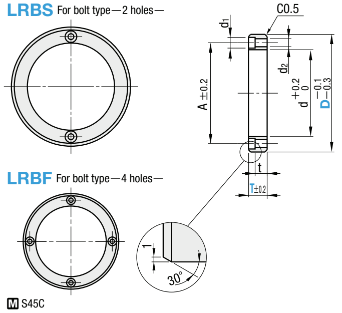
LOCATING RINGS

Combination examples of locating rings P.735

Non JIS material definition is listed on P.1351 - 1352

RoHS

LRBS For bolt type—2 holes—


C0.5
d1
d2
A ±0.2
d +0.2 0
D −0.1 −0.3
t
T±0.2
1
30°

LRBF For bolt type—4 holes—

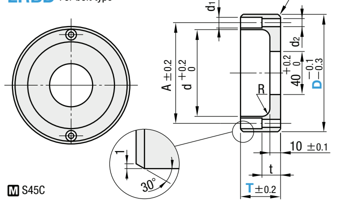
M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	t	d	A	Part Number Type	Part Number D	T	U/Price 1~9 LRBS	U/Price 1~9 LRBF
M5	5.5	9	5	40	50	LRBS —2 holes— LRBF —4 holes—	60	10	Quotation	
								15		
								20		
								25		
M6	6.5	11	3	70	85		100	10		
			8					15		
								20		
								25		
								30		
			3	80	95		110	*10		
			8					15		
								*20		
								*25		
			3	90	105		120	10		
			8					15		
								20		
								25		
M8	9	14	6	110	130		150	15		
								20		
								25		

Which marked with * is available for LRBS only.

RoHS

LRBD For bolt type

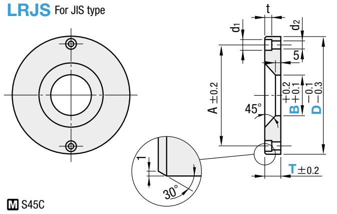

C0.5
d1
d2
A ±0.2
d +0.2 0
40 +0.2 0
D −0.1 −0.3
R
10 ±0.1
t
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	t	R	d	A	Part Number Type	Part Number D	T	U/Price 1~9
M6	6.5	11	9	5	70	85	LRBD	100	15	Quotation
									20	
			20	10					35	
									40	
									45	
			9	5	90	105		120	15	
									20	
			20	10					35	
									40	
									45	

RoHS

LRJS For JIS type

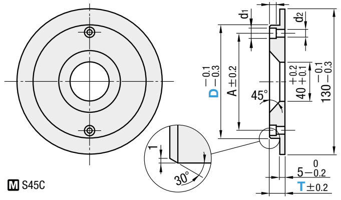

t
d1
d2
5
A ±0.2
45°
B +0.1 0
d +0.2 0
D −0.1 −0.3
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	Bolt hole t	A	Part Number Type	Part Number D	T	B	U/Price 1~9
M6	6.5	11	6.5	85	LRJS	100	15	35 40 50	Quotation
							20		
							25	35 40	
						120	15	35 40 50	
							20		
M8	9	14	8.6	100		150	15	40 50	
							20	35 40 50	

RoHS

LRJST Runner lock pin pressing type

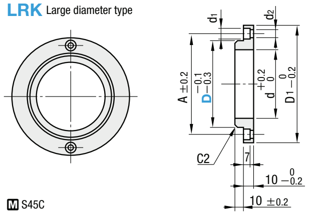

t
d1
d2
D −0.1 −0.3
A ±0.2
45°
40 +0.2 +0.1
130 −0.1 −0.3
5 0 −0.2
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	Bolt hole t	A	Part Number Type	Part Number D	T	U/Price 1~9
M6	6.5	11	6.5	85	LRJST	100	15	Quotation
							20	

RoHS

LRK Large diameter type

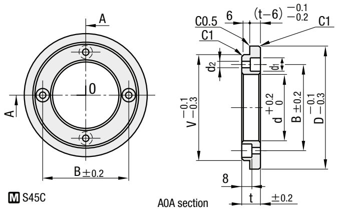

d1
d2
A ±0.2
D −0.1 −0.3
d +0.2 0
D1 −0.2
C2
7
10 0 −0.2
10 ±0.2

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	D1	d	A	Part Number Type	Part Number D	U/Price 1~9
M6	6.5	11	130	85	115	LRK	100	Quotation
			150	105	135		120	

RoHS

LRBW Reversible Locating Rings—For bolt type—

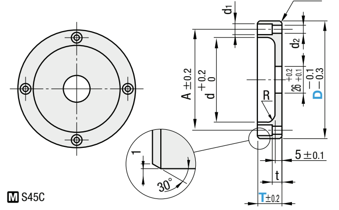

A
O
A
B±0.2
C0.5
C1
6
(t−6) −0.1 −0.2
C1
d1
d2
V −0.1 −0.3
d +0.2 0
B ±0.2
D −0.1 −0.3
8
t ±0.2
AOA section

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	d	B	V	D	t	Part Number Type	Part Number No.	U/Price 1~9
M5	5.5	9	40	50	60	100	14	LRBW	100	Quotation
							16		100−16	
M6	6.5	11	70	85	100	120	14		120	
							16		120−16	
						130	14		130	
							16		130−16	

RoHS

LRSS For shoulder type

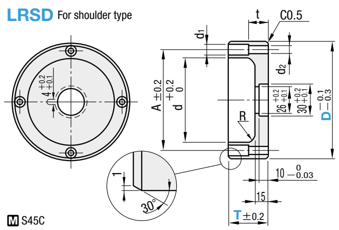

C0.5
d1
d2
A ±0.2
d +0.2 0
26 +0.1 0
D −0.1 −0.3
R
5 ±0.1
t
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	t	R	d	A	Part Number Type	Part Number D	T	U/Price 1~9
M5	5.5	9	4.5	5	40	50	LRSS	60	10	Quotation
			5						15	
									20	
									25	
M6	6.5	11	3.5		70	85		100	10	
			8						15	
				10					20	
									25	
									30	
									35	
				5	80	95		110	15	
				10					20	
									25	
				5	90	105		120	15	
				10					20	
									25	
M8	9	14	6	5	110	130		150	15	
				10					20	
									25	

RoHS

LRSD For shoulder type

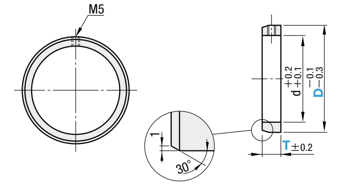

t
C0.5
d1
d2
4 +0.2 +0.1
A ±0.2
d +0.2 0
26 +0.1 0
30 +0.2 0
D −0.1 −0.3
R
10 0 −0.03
15
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole d2	Bolt hole d1	t	R	d	A	Part Number Type	Part Number D	T	U/Price 1~9
M6	6.5	11	20	10	70	85	LRSD	100	35	Quotation
									40	
									45	
					90	105		120	35	
									40	
									45	

RoHS

LAR Locating Ring Adapter


M5
d +0.2 +0.1
D −0.1 −0.3
T±0.2
1
30°

M S45C

d	Part Number Type	Part Number D	T	U/Price 1~9
60	LAR	100	10	Quotation
			15	
			20	
100		120	10	
			15	
			20	

Order

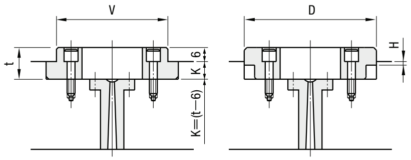
Part Number	—	T	—	B
LRBS 120	—	15		
LRBW100				
LRJS 100	—	15	—	35

Days to Ship Quotation

Price Quotation

Example

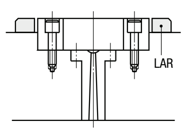
LRBW Reversible locating ring—For bolt type—



- It can be installed from both sides.
- Outer diameter of locating ring can be selected to suit a molding machine.

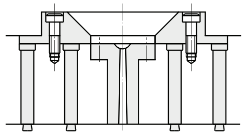
When No.=100・120・130; K=8, H=2
When No.=100−16・120−16・130−16; K=10, H=4

LAR Adaptor ring for locating



- Making the locating ring diameter wider by one size without locating ring replacement is possible by installing LAR on the outer side of locating ring.

LRJST Runner lock pin pressing type



- A wide range of runner lock pins can be pressed by the head of locating ring.

Package Sales Information

To satisfy the customers' requirements, ejector pins, locating rings, cooling items and dowel pins have begun to sell in packages.

By package sales

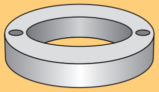
The price is reduced!!

PRICE DOWN OFF

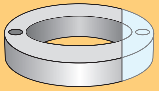
Comparison of unit prices Ex. LRBS60-15

Usual volume discount

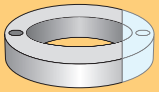
1pc. @650 yen
Total 650 yen



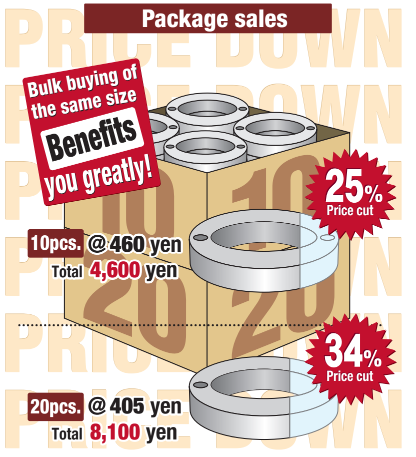
10pcs. @617 yen
Total 6,170 yen



20pcs. @617 yen
Total 12,340 yen



Package sales


Bulk buying of the same size
Benefits you greatly!
10
20
25% Price cut
34% Price cut
PRICE DOWN

10pcs. @460 yen
Total 4,600 yen

20pcs. @405 yen
Total 8,100 yen

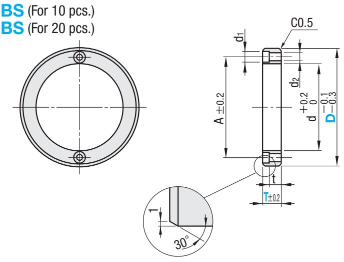
Order

Part Number			—	T
PACK	Type	D		
(For 10 pcs.) 10 PACK	—LRBS	60	—	15
(For 20 pcs.) 20 PACK	—LRBS	100	—	20

Non JIS material definition is listed on P.1351 - 1352

—For bolt type (2 holes)— RoHS

10 PACK—LRBS (For 10 pcs.)
20 PACK—LRBS (For 20 pcs.)


C0.5
d1
d2
A ±0.2
d +0.2 0
D −0.1 −0.3
t
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole		t	d	A	Part Number			T	U/Price	
	d2	d1				PACK	Type	D		10 PACK	20 PACK
M5	5.5	9	5	40	50	10 PACK 20 PACK	LRBS	60	15	Quotation	
M6	6.5	11	8	70	85			100	15 20		

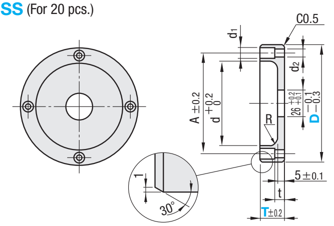
Order

Part Number			—	T
PACK	Type	D		
(For 10 pcs.) 10 PACK	—LRBS	60	—	15
(For 20 pcs.) 20 PACK	—LRBS	100	—	20

Days to Ship **Quotation**

—For shoulder type— RoHS

10 PACK—LRSS (For 10 pcs.)
20 PACK—LRSS (For 20 pcs.)


C0.5
d1
d2
A ±0.2
d +0.2 0
26 +0.2 +0.1
D −0.1 −0.3
R
5±0.1
t
T±0.2
1
30°

M S45C

Applicable bolts	Bolt hole		t	R	d	A	Part Number			T	U/Price	
	d2	d1					PACK	Type	D		10 PACK	20 PACK
M6	6.5	11	8	5 10	70	85	10 PACK 20 PACK	LRSS	100	15 20	Quotation	

Order

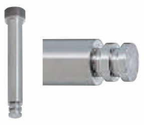
Part Number			—	T
PACK	Type	D		
(For 10 pcs.) 10 PACK	—LRSS	100	—	15
(For 20 pcs.) 20 PACK	—LRSS	100	—	20

Days to Ship **Quotation**

COMPONENTS OF RUNNER · ELECTRODES

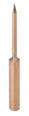
COMPONENTS OF RUNNER ELECTRODES

Product Name **Part Number**	Runner Lock Pins—Straight・standard type— RLR RLR□ RLR□F	—Straight・hard lock type— RLH RLH□ RLH□F	—Tapered・standard type— RLT□ RLT□F	—Tapered・hard lock type— RHT□ RHT□F
Page	799	800	801	802

						
Runner Lock Pins—Straight・standard (with introduction) type— RLRSB	RLRSBF	—Straight・tip edge type— RLREB	RLREBF	—Straight・cone-shaped tip type— RLK□	RLK□F	Runner Lock Pins—Straight・super hard lock type— RLEL
803	803	804	804	805	805	806

Runner Lock Pin Collars RLC	Runner Lock Pin Bushings RLBS RLBT RLBST	Runner Ejector Sets RES RESA RESB	Runner Change Pins—L dimension selection/designation type (for Z pin combination)— RCPNZ RCPLZ
806	807	808	809

—For Ejection pin L dimension selection/designation type— RCPN RCPL	—For fixed side type— RCPK	Adjustable Pins For Runner Flow L dimension selection/designation type RFAN RFAL	Adjustment Bolts For Runner Flow Rate RRCB
811	813	817	819

				
Electrodes for Pin-point Gate EMPG (For processing of SR part)	EMPGA (For processing of gate part)	Electrodes for Oblique Gate EMSG	Undersized Tapping Electrodes EMTA EMTWA EMTB	Electrodes for Round Engraving EMLM
821	821	822	823	824

GUIDE FOR COMPONENTS OF RUNNER①

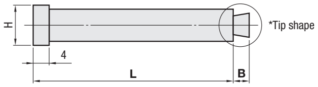
—RUNNER LOCK PINS—

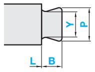
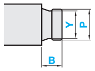
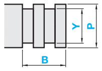
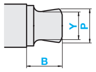
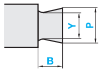
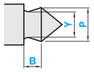
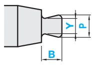
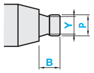
GUIDE FOR COMPONENTS OF RUNNER②

—RUNNER LOCK PIN BUSHINGS／RUNNER CHANGE PINS—

Non JIS material definition is listed on P.1351 - 1352

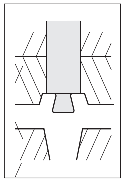
■Runner Lock Pins M SKH51 H 58～60HRC



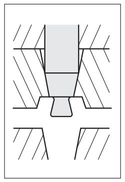
	Type	*Tip shape	Part Number						Applicable Runner Lock Bushings
			Normal head diameter				Large head diameter		
			L dimension selection	L dimension designation			L dimension designation		
			B dimension selection	B dimension selection		B dimension designation	B dimension selection	B dimension designation	
			P · Y dimension selection	P · Y dimension selection	P · Y dimension designation		P · Y dimension designation		
Straight type	**Standard** —All-purpose type— (P.799)		RLR	RLRL	RLRB	RLRBF	RLRG	RLRGF	RLBST RLBS
	Hard Lock —Strong lock type— (P.800)		RLH	RLHL	RLHB	RLHBF	RLHG	RLHGF	
	Super Hard Lock —Strong lock type— (P.806)		—	RLEL	—	—	—	—	
	With introduction —Chipping prevention type— (P.803)		—	—	RLRSB	RLRSBF	—	—	
	Tip edge —Soft resin correspondence type— (P.804)		—	—	RLREB	RLREBF	—	—	
	Cone-shaped tip —Short cooling time type— (P.805)		—	RLKL RLKS	RLKB	RLKBF	RLKG	RLKGF	
Tapered type	**Standard** —All-purpose type— (P.801)		—	—	RLTB	RLTBF	RLTG	RLTGF	RLBT
	Hard Lock —Strong lock type— (P.802)		—	—	RHTB	RHTBF	RHTG	RHTGF	

ex Example

Example of Runner Lock Pins use



Straight type usage



Tapered type usage

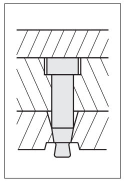
■Applicable Screw Plugs

Refer to P.1193 for the standard.

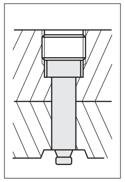
D	Standard head type		Large head type	
	H	Applicable Screw Plugs	H	Applicable Screw Plugs
2	4	MSW 6	4	MSW 6
2.5	5	MSW 8	6	MSW 8
3	5	MSW 8	6	MSW 8
4	6	MSW 8	7	MSW10
5	7	MSW10	8	MSW10
6	8	MSW10	9	※MSW12
8	10	※MSW12	11	※MSW14
10	13	※MSW16	15	※MSW18

※Fine thread (Pitch 1.5)

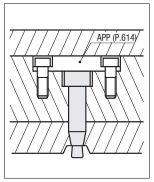
How to hold down runner lock pins



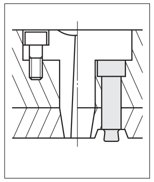
Held down with a locating ring, heat insulating plate, etc.



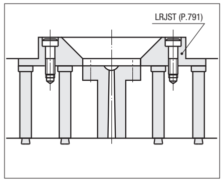
Held down with a screw plug.



Held down with an angular pin stopper plate (APP).

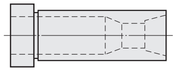
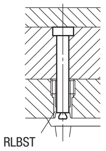
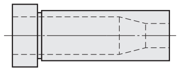
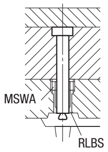
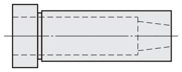
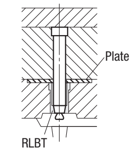


Held down with a sprue bushing.

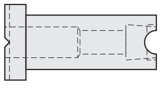
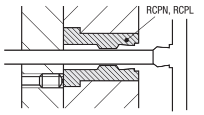
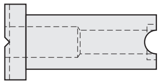
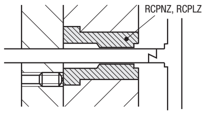
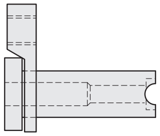
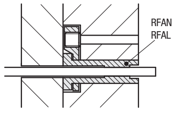
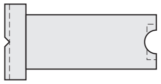
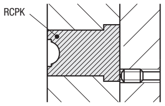


Held down with a locating ring.

■Runner Lock Pin Bushings M SKD11 H 60～63HRC

Type	Characteristics	Shape	Catalog page	Part Number	Example
For straight, no tapering required	The bushing is tapered and facilitates processing plates.		P.807	RLBST	
For straight	Guide for straight runner lock pin		P.807	RLBS	
For tapered	Guide for tapered runner lock pin		P.807	RLBT	

■Runner Change Pins M SKD61 H 48～52HRC

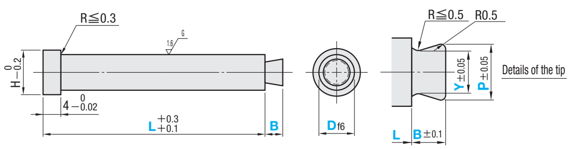
	Type	Characteristics	Shape	Catalog page	Part Number		Example
					L dimension selection	L dimension designation	
For movable side	For ejector pin	The runner change pin itself has a sprue lock function. Use it together with the ejector pin with tip shape processing.		P.811	RCPN	RCPL	
	For Z pin assembling	Sprue lock function by using a Z pin. (Ejector pin with Z groove P.91)		P.809	RCPNZ	RCPLZ	
	Flow quantity adjustable	By using this type together with a stopper, fine adjustment of the runner flow rate can be performed from the PL face.		P.817	RFAN	RFAL	
Fixed side type		Type used without combining ejector pin. For fixed side.		P.813	RCPK	—	

RUNNER LOCK PINS

—STRAIGHT, STANDARD TYPE—

RoHS

Application	Part Number	M	H
Standard head type	RLR	SKH51	58～60HRC
	RLRL		
	RLRB		
	RLRBF		
Large head type	RLRG		
	RLRGF		



■L dimension selection type

H	B	P	Y	Part Number Type	D	L										U/Price 1～4
4	2	1.5	1.0	RLR (Standard head type)	2	15	20	25	30	35	40					Quotation
5		2.3	1.8		3	15	20	25	30	35	40	45	50			
6	2.5	2.8	2.3		4		20	25	30	35	40	45	50	60	70	80
7	3	3.3	2.8		5		20	25	30	35	40	45	50	60	70	80
8		3.8	3.0		6				30	35	40	45	50	60	70	80
10	4	5.8	5.0		8				30	35	40	45	50	60	70	80

■L dimension designation type

H	B	P	Y	Part Number Type	D	L 0.1mm increments	U/Price 1～4
4	2	1.5	1.0	RLRL (Standard head type)	2	10.0～100.0	Quotation
5		2.0	1.5		2.5		
		2.3	1.8		3		
6	2.5	2.8	2.3		4		
7	3	3.3	2.8		5		
8		3.8	3.0		6	15.0～100.0	
10	4	5.8	5.0		8		

■L・P・Y dimension designation type

H RLRB	H RLRG	B	Part Number Type	D	L	P	Y	U/Price 1～4 RLRB	U/Price 1～4 RLRG
4	4	2	RLRB (Standard head type) RLRG (Large head type)	2	10.0～100.0	0.9～1.9	0.8～1.8	Quotation	
5	6			2.5		0.9～2.4	0.8～2.3		
				3		0.9～2.9	0.8～2.8		
6	7	2.5		4		1.1～3.9	1.0～3.8		
7	8	3		5		1.3～4.9	1.2～4.8		
8	9			6	15.0～100.0	1.6～5.9	1.5～5.8		
10	11	4		8		2.1～7.9	2.0～7.8		
13	15	5		10		2.6～9.9	2.5～9.8		

P>Y

■L・P・Y・B dimension designation type

H RLRBF	H RLRGF	Part Number Type	D	L	P	Y	B	U/Price 1～4 RLRBF	U/Price 1～4 RLRGF
4	4	RLRBF (Standard head type) RLRGF (Large head type)	2	10.0～100.0	0.9～1.9	0.8～1.8	0.8～3.0	Quotation	
5	6		2.5		0.9～2.4	0.8～2.3	0.8～3.0		
			3		0.9～2.9	0.8～2.8	0.8～3.0		
6	7		4		1.1～3.9	1.0～3.8	1.3～3.8		
7	8		5		1.3～4.9	1.2～4.8	1.5～4.5		
8	9		6	15.0～150.0	1.6～5.9	1.5～5.8	1.5～4.5		
10	11		8		2.1～7.9	2.0～7.8	2.0～6.0		
13	15		10		2.6～9.9	2.5～9.8	2.5～7.5		

P>Y

Order

Part Number	—	L	—	P	—	Y	—	B
RLR 3	—	30						
RLRG 4	—	37.5	—	P2.8	—	Y2.3		
RLRGF4	—	37.5	—	P2.8	—	Y2.3	—	B3.0

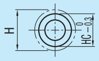
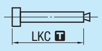
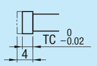
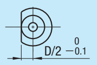
Days to Ship Quotation

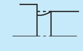
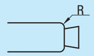
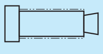
Price Quotation

Alterations

Part Number — L — P — Y — B — (HC・LKC···etc.)

RLRGF 4 — 37.51 — P2.8 — Y2.3 — B2.4 — HC5—LKC

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H ⊗ Not available for RLR.	Quotation
	LKC	Changes L dimension tolerance L $^{+0.3}_{+0.1}$ ···› L $^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.) ⊗ Not available for RLR.	
	TC	TC=0.1mm increments 2.0≦TC<4 L dimension remains unchanged even when TC is used. 4—TC≦Lmax.—L ⊗ Not available for RLR.	
	KC	Single flat cutting ⊗ Not available when L<16 ⊗ Not available for RLR.	

Alterations	Code	Spec.	1Code
	TRN	Adds a relief under the head. (No need for plate chamfering) ⊗ Not available for RLR.	Quotation
	DR	D dimension end R processing. (R0.1～0.3) About simple processing, it is not precise R shape. ⊗ Not available for RLR.	
	DC	D dimension designation (0.1mm increments) P≦DC—0.1 Y≦DC—0.2 ⊗ Not available for RLR and RLRL. ⊗ Not available when D=2, 2.5.	

D	DC designation range (f6)
3	2.0～2.9
4	3.0～3.9
5	4.0～4.9
6	5.0～5.9
8	6.0～7.9
10	8.0～9.9

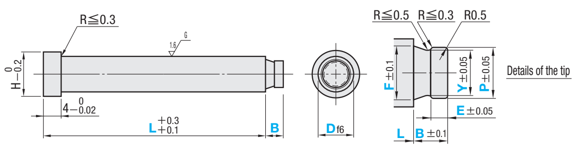
RUNNER LOCK PINS

—STRAIGHT, HARD LOCK TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Application	Part Number	M	H
Standard head type	RLH	SKH51	58～60HRC
	RLHL		
	RLHB		
	RLHBF		
Large head type	RLHG		
	RLHGF		



■L dimension selection type

H	B	E	P	Y	F	Part Number Type	D	L										U/Price 1～4
4	2	1	1.5	1.0	1.7	RLH (Standard head type)	2	15	20	25	30	35	40					Quotation
5			2.3	1.8	2.5		3	15	20	25	30	35	40	45	50			
6	2.5		2.8	2.3	3.0		4		20	25	30	35	40	45	50	60	70	80
7	3	1.5	3.3	2.8	3.5		5		20	25	30	35	40	45	50	60	70	80
8			3.8	3.0	4.0		6				30	35	40	45	50	60	70	80
10	4	2	5.8	5.0	6.0		8				30	35	40	45	50	60	70	80

■L dimension designation type

H	B	E	P	Y	F	Part Number Type	D	L 0.1mm increments	U/Price 1～4
4	2	1	1.5	1.0	1.7	RLHL (Standard head type)	2	10.0～100.0	Quotation
5			2.3	1.8	2.5		3		
6	2.5		2.8	2.3	3.0		4		
7	3	1.5	3.3	2.8	3.5		5		
8			3.8	3.0	4.0		6	15.0～100.0	
10	4	2	5.8	5.0	6.0		8		

■L・P・Y・F dimension designation type

H RLHB	H RLHG	B	E	Part Number Type	D	L	P	Y	F	U/Price 1～4 RLHB	U/Price 1～4 RLHG
4	4	2	1	RLHB (Standard head type) RLHG (Large head type)	2	10.0～100.0	1.3～1.9	0.8～1.4	Y≦F<D	Quotation	
5	6				3		1.3～2.9	0.8～2.4			
6	7	2.5			4		1.5～3.9	1.0～3.4			
7	8	3	1.5		5		1.7～4.9	1.2～4.4			
8	9				6	15.0～100.0	2.0～5.9	1.5～5.4			
10	11	4	2		8		2.5～7.9	2.0～7.4			
13	15	5	2.5		10		3.0～9.9	2.5～9.4			

P—Y≧0.5

■L・P・Y・F・B・E dimension designation type

H RLHBF	H RLHGF	Part Number Type	D	L	P	Y	F	B	E	B—Emin.	U/Price 1～4 RLHBF	U/Price 1～4 RLHGF
4	4	RLHBF (Standard head type) RLHGF (Large head type)	2	10.0～100.0	1.3～1.9	0.8～1.4	Y≦F<D	1.5～3.0	0.5～1.5	1.0	Quotation	
5	6		3		1.3～2.9	0.8～2.4						
6	7		4		1.5～3.9	1.0～3.4		1.8～3.8		1.5		
7	8		5		1.7～4.9	1.2～4.4		2.3～4.5	0.8～2.3			
8	9		6	15.0～150.0	2.0～5.9	1.5～5.4						
10	11		8		2.5～7.9	2.0～7.4		3.0～6.0	1.0～3.0	2.0		
13	15		10		3.0～9.9	2.5～9.4		3.8～7.5	1.3～3.8	2.5		

P—Y≧0.5

Order

Part Number	—	L	—	P	—	Y	—	F		B	—	E
RLH 6	—	70										
RLHG 4	—	37.5	—	P2.8	—	Y2.3	—	F3.0				
RLHGF4	—	37.5	—	P2.8	—	Y2.3	—	F3.0	—	B3.0	—	E1.0

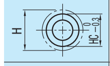
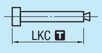
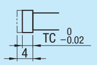
Days to Ship Quotation

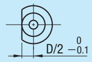
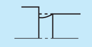
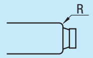
Price Quotation

Alterations

Part Number — L — P — Y — F B — E — (HC・LKC···etc.)

RLHGF 4 — 37.51 — P2.8 — Y2.3 — F3.0 — B3.0 — E1.0 — HC5 — LKC

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H ⊗ Not available for RLH.	Quotation
	LKC	Changes L dimension tolerance L $^{+0.3}_{+0.1}$ ···› L $^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.) ⊗ Not available for RLH.	
	TC	TC=0.1mm increments 2.0≦TC<4 L dimension remains unchanged even when TC is used. 4—TC≦Lmax.—L ⊗ Not available for RLH.	

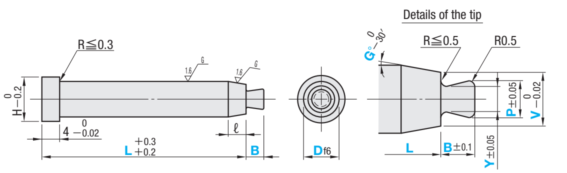
Alterations	Code	Spec.	1Code
	KC	Single flat cutting ⊗ Not available when L<16 ⊗ Not available for RLH.	Quotation
	TRN	Adds a relief under the head. (No need for plate chamfering) ⊗ Not available for RLH.	
	DR	D dimension end R processing. (R0.1～0.3) About simple processing, it is not precise R shape. ⊗ Not available for RLH.	

RUNNER LOCK PINS

—TAPERED, STANDARD TYPE—

RoHS

Application	Part Number	Ⓜ	Ⓗ
Standard head type	RLTB	SKH51	58～60HRC
	RLTBF		
Large head type	RLTG		
	RLTGF		



(Calculation of ℓ value) $\ell = \dfrac{D-V}{2\tan G}$ Conversion Chart of Trigonometric Functions P.1337

■L・P・Y dimension designation type

H RLTB	H RLTG	B	V	G°	Part Number Type	Part Number D	0.1mm increments L	0.1mm increments P	0.1mm increments Y	U/Price 1～4 RLTB	U/Price 1～4 RLTG
5	—	2	2.5	5	RLTB (Standard head type) RLTG (Large head type)	*3	20.0～100.0	0.9～2.1	0.8～2.0	Quotation	—
6	7	2.5	3.0			4		1.1～2.4	1.0～2.3		Quotation
7	8	3	3.5			5		1.3～2.8	1.2～2.7		
8	9		4.0			6	25.0～100.0	1.6～3.3	1.5～3.2		
10	11	4	6.0			8		2.1～5.2	2.0～5.1		
13	15	5	8.0			10		2.6～7.0	2.5～6.9		

P＞Y Which marked with * is for RLTB only.

■L・P・Y・B・V・G dimension designation type

H RLTBF	H RLTGF	Part Number Type	Part Number D	0.1mm increments L	0.1mm increments P	0.1mm increments Y	0.1mm increments B	0.1mm increments V	1° increments G°	U/Price 1～4 RLTBF	U/Price 1～4 RLTGF
5	—	RLTBF (Standard head type) RLTGF (Large head type)	*3	20.0～100.0	0.9～2.1	0.8～2.0	0.8～3.0	2.5～2.9	5～10	Quotation	—
6	7		4		1.1～2.4	1.0～2.3	1.3～3.8	3.0～3.9			Quotation
7	8		5		1.3～2.8	1.2～2.7	1.5～4.5	3.5～4.9			
8	9		6	25.0～150.0	1.6～3.3	1.5～3.2	1.5～4.5	4.0～5.9			
10	11		8		2.1～5.2	2.0～5.1	2.0～6.0	6.0～7.9			
13	15		10		2.6～7.0	2.5～6.9	2.5～7.5	8.0～9.9			

P＞Y Which marked with * is for RLTBF only.

Order

Part Number		L		P		Y		B		V		G
RLTG 4	—	50.2	—	P1.5	—	Y1.2						
RLTGF4	—	50.2	—	P1.5	—	Y1.2	—	B2.0	—	V3.0	—	G5

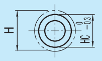
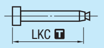
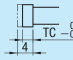
Days to Ship Quotation

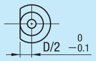
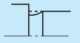
Example P.797

Price Quotation

Alterations

Part Number		L		P		Y		B		V		G		(HC・LKC···etc.)
RLTGF4	—	50.25	—	P1.5	—	Y1.2	—	B2.0	—	V3.0	—	G5	—	LKC

Alterations	Code	Spec.	1Code
	HC	HC＝0.1mm increments D≦HC＜H	Quotation
	LKC	Changes L dimension tolerance L$^{+0.3}_{+0.2}$ ···› L$^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.)	
	TC	TC＝0.1mm increments 2.0≦TC＜4 L dimension remains unchanged even when TC is used. 4—TC≦Lmax.—L	

Alterations	Code	Spec.	1Code
	KC	Single flat cutting	Quotation
	TRN	Adds a relief under the head. (No need for plate chamfering)	

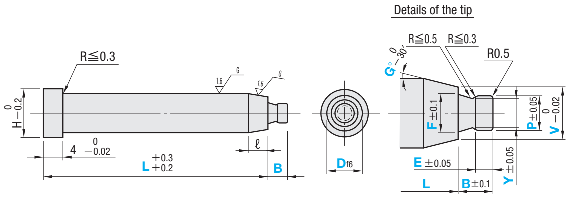
RUNNER LOCK PINS

—TAPERED, HARD LOCK TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Application	Part Number	Ⓜ	Ⓗ
Standard head type	RHTB	SKH51	58～60HRC
	RHTBF		
Large head type	RHTG		
	RHTGF		



(Calculation of ℓ value) $\ell = \dfrac{D-V}{2\tan G}$ Conversion Chart of Trigonometric Functions P.1337

■L・P・Y・F dimension designation type

H RHTB	H RHTG	B	E	V	G°	Part Number Type	Part Number D	0.1mm increments L	0.1mm increments P	0.1mm increments Y	0.1mm increments F	U/Price 1～4 RHTB	U/Price 1～4 RHTG
6	7	2.5	1	3.0	5	RHTB (Standard head type) RHTG (Large head type)	4	20.0～100.0	1.5～2.4	1.0～1.9	Y≦F＜V	Quotation	
7	8	3	1.5	3.5			5		1.7～2.8	1.2～2.3			
8	9			4.0			6	25.0～100.0	2.0～3.3	1.5～2.8			
10	11	4	2	6.0			8		2.5～5.2	2.0～4.7			
13	15	5	2.5	8.0			10		3.0～7.0	2.5～6.5			

P—Y≧0.5

■L・P・Y・F・B・E・V・G dimension designation type

H RHTBF	H RHTGF	Part Number Type	Part Number D	0.1mm increments L	0.1mm increments P	0.1mm increments Y	0.1mm increments F	0.1mm increments B	0.1mm increments E	0.1mm increments B—Emin.	0.1mm increments V	1° increments G°	U/Price 1～4 RHTBF	U/Price 1～4 RHTGF
6	7	RHTBF (Standard head type) RHTGF (Large head type)	4	20.0～100.0	1.5～3.9	1.0～3.4	Y≦F＜V	1.8～3.8	0.5～1.5	1.5	3.0～3.9	5～10	Quotation	
7	8		5		1.7～4.9	1.2～4.4		2.3～4.5	0.8～2.3		3.5～4.9			
8	9		6	25.0～150.0	2.0～5.9	1.5～5.4					4.0～5.9			
10	11		8		2.5～7.9	2.0～7.4		3.0～6.0	1.0～3.0	2.0	6.0～7.9			
13	15		10		3.0～9.9	2.5～9.4		3.8～7.5	1.3～3.8	2.5	8.0～9.9			

P—Y≧0.5

Order

Part Number		L		P		Y		F		B		E		V		G
RHTG 4	—	50.2	—	P1.8	—	Y1.3	—	F2.4								
RHTGF4	—	50.2	—	P1.8	—	Y1.3	—	F2.4	—	B3.0	—	E1.0	—	V3.2	—	G5

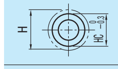
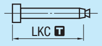
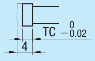
Days to Ship Quotation

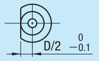
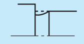
Example P.797

Price Quotation

Alterations

Part Number		L		P		Y		F		B		E		V		G		(HC・LKC···etc.)
RHTGF4	—	50.2	—	P1.8	—	Y1.3	—	F2.4	—	B3.0	—	E1.0	—	V3.0	—	G5	—	LKC

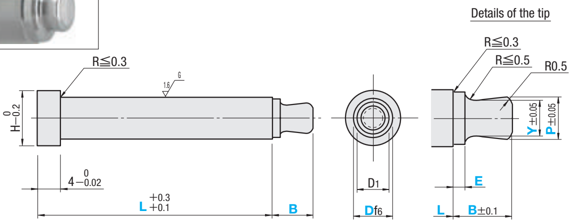
Alterations	Code	Spec.	1Code
	HC	HC＝0.1mm increments D≦HC＜H	Quotation
	LKC	Changes L dimension tolerance L$^{+0.3}_{+0.2}$ ···› L$^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.)	
	TC	TC＝0.1mm increments 2.0≦TC＜4 L dimension remains unchanged even when TC is used. 4—TC≦Lmax.—L	

Alterations	Code	Spec.	1Code
	KC	Single flat cutting	Quotation
	TRN	Adds a relief under the head. (No need for plate chamfering)	

RUNNER LOCK PINS

—STRAIGHT, WITH INTRODUCTION TYPE—

Application	Part Number	M	H
Standard head type	RLRSB RLRSBF	SKH51	58～60HRC


Details of the tip
R≦0.3
R≦0.3
R≦0.5
R0.5
1.6
G
H −0.2 0
4 −0.02 0
L +0.3 +0.1
B
D1
Df6
Y±0.05
P±0.05
E
L
B±0.1

■L・P・Y dimension designation type

H	B	E	D1	Part Number Type	D	0.1mm increments L	P	Y	U/Price 1～4
4	2	0.5	1.8	RLRSB (Standard head type)	2	10.0～100.0	0.9～1.8	0.8～1.7	Quotation
5			2.8		3		0.9～2.8	0.8～2.7	
6	2.5	0.8	3.8		4		1.1～3.8	1.0～3.7	
7	3	1	4.6		5		1.3～4.6	1.2～4.5	
8			5.6		6	15.0～100.0	1.6～5.6	1.5～5.5	

P＞Y

■L・P・Y・B・E dimension designation type

H	D1	Part Number Type	D	0.1mm increments L	P	Y	B	E	U/Price 1～4
4	1.8	RLRSBF (Standard head type)	2	10.0～100.0	0.9～1.8	0.8～1.7	1.5～3.0	0.5～1.0	Quotation
5	2.8		3		0.9～2.8	0.8～2.7	1.5～3.0	0.5～1.0	
6	3.8		4		1.1～3.8	1.0～3.7	1.5～3.8	0.5～1.0	
7	4.6		5		1.3～4.6	1.2～4.5	1.5～4.5	0.5～1.0	
8	5.6		6	15.0～100.0	1.6～5.6	1.5～5.5	1.5～4.5	0.5～1.0	

P＞Y　B≧E＋1

Order

Part Number	L	P	Y	B	E
RLRSB 4	37.5	P2.8	Y2.3		
RLRSBF5	50.0	P4.0	Y3.5	B3.5	E0.5

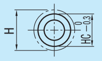
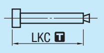
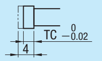
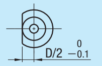
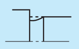
Days to Ship Quotation

Price Quotation

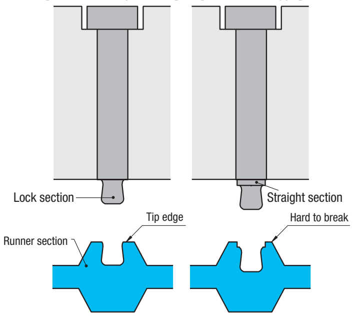
Alterations

Part Number — L — P — Y — B — E — (HC・LKC…etc.)

RLRSBF5 — 50.0 — P4.0 — Y3.5 — B3.5 — E0.5 — HC5 — LKC

Alterations	Code	Spec.	1Code
	HC	HC＝0.1mm increments D≦HC＜H	Quotation
	LKC	Changes L dimension tolerance $L^{+0.3}_{+0.1}$ ⋯→ $L^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.)	
	TC	TC＝0.1mm increments 2.0≦TC＜4 L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	
	KC	Single flat cutting Not available when L＜16	
	TRN	Adds a relief under the head. (No need for plate chamfering)	

Example


[Conventional products]
[Introduction type]
Lock section
Straight section
Tip edge
Hard to break
Runner section

■**Features of Introduction type**

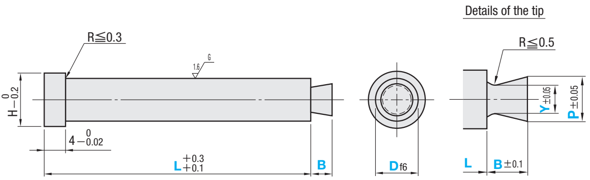
Lock section is designed to have a straight step in order to prevent runner from chipping which occurs in molding of hard resin, resin with glass fiber and etc.

RUNNER LOCK PINS

—STRAIGHT, TIP EDGE TYPE—

Non JIS material definition is listed on P.1351 - 1352

Application	Part Number	M	H
Standard head type	RLREB RLREBF	SKH51	58～60HRC


Details of the tip
R≦0.3
R≦0.5
1.6
G
H −0.2 0
4 −0.02 0
L +0.3 +0.1
B
Df6
Y±0.05
P±0.05
L
B±0.1

■L・P・Y dimension designation type

H	B	Part Number Type	D	0.1mm increments L	P	Y	U/Price 1～4
4	2	RLREB (Standard head type)	2	10.0～100.0	0.9～1.9	0.8～1.8	Quotation
5			3		0.9～2.9	0.8～2.8	
6	2.5		4		1.1～3.9	1.0～3.8	
7	3		5		1.3～4.9	1.2～4.8	
8			6	15.0～100.0	1.6～5.9	1.5～5.8	
10	4		8		2.1～7.9	2.0～7.8	

P＞Y

■L・P・Y・B dimension designation type

H	Part Number Type	D	0.1mm increments L	P	Y	B	U/Price 1～4
4	RLREBF (Standard head type)	2	10.0～100.0	0.9～1.9	0.8～1.8	0.8～3.0	Quotation
5		3		0.9～2.9	0.8～2.8	0.8～3.0	
6		4		1.1～3.9	1.0～3.8	1.3～3.8	
7		5		1.3～4.9	1.2～4.8	1.5～4.5	
8		6	15.0～150.0	1.6～5.9	1.5～5.8	1.5～4.5	
10		8		2.1～7.9	2.0～7.8	2.0～6.0	

P＞Y

Order

Part Number	L	P	Y	B
RLREB 4	40.5	P2.8	Y2.3	
RLREBF5	50.5	P4.0	Y3.5	B3.5

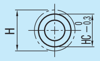
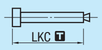
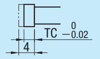
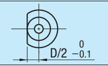
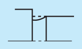
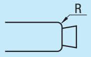
Days to Ship Quotation

Price Quotation

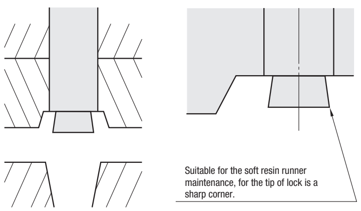
Alterations

Part Number — L — P — Y — B — (HC・LKC…etc.)

RLREBF4 — 37.51 — P2.8 — Y2.3 — B2.4 — HC5 — LKC

Alterations	Code	Spec.	1Code
	HC	HC＝0.1mm increments D≦HC＜H	Quotation
	LKC	Changes L dimension tolerance $L^{+0.3}_{+0.1}$ ⋯→ $L^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.)	
	TC	TC＝0.1mm increments 2.0≦TC＜4 L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	
	KC	Single flat cutting Not available when L＜16	
	TRN	Adds a relief under the head. (No need for plate chamfering)	
	DR	D dimension end R processing. (R0.1～0.3) About simple processing, it is not precise R shape.	

Example Useful for soft resin, such as thermoplastic elastome (TPE), liquid silicone rubber (LSR) and etc. requiring strong runner lock.

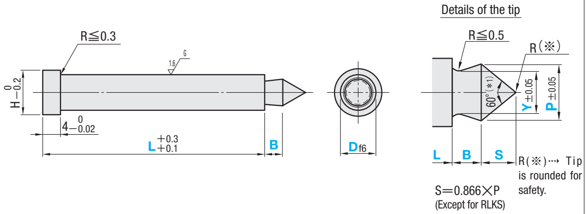

Suitable for the soft resin runner maintenance, for the tip of lock is a sharp corner.

RUNNER LOCK PINS

—STRAIGHT, CONE-SHAPED TIP TYPE—

RoHS

Application	Part Number	M	H
Standard head type	RLKL	SKH51	58~60HRC
	RLKS		
	RLKB		
	RLKBF		
Large head type	RLKG		
	RLKGF		



R(※)⋯ Tip is rounded for safety.

S=0.866×P
(Except for RLKS)

■L dimension designation type

H	B	P	Y	Part Number		0.1mm increments	U/Price
				Type	D	L	1~4
4	2	1.5	1.0	RLKL (Standard head type)	2	10.0~100.0	Quotation
5		2.3	1.8		3		
6	2.5	2.8	2.3		4		
7	3	3.8	2.8		5		
8			3.0		6	15.0~100.0	
10	4	5.8	5.0		8		

■L · S dimension designation type

H	B	P	Y	Part Number		0.1mm increments		U/Price
				Type	D	L	S	1~4
4	2	1.5	1.0	RLKS (Standard head type)	2	10.0~100.0	1.3~3.0	Quotation
5		2.3	1.8		3		2.0~5.5	
6	2.5	2.8	2.3		4		2.5~7.5	
7	3	3.8	2.8		5		3.3~9.0	
8			3.0		6	15.0~100.0	3.3~9.0	
10	4	5.8	5.0		8		5.1~8.0	

(*1) Tip 60° change by S dimensions.

■L · P · Y dimension designation type

H		B	Part Number		0.1mm increments			U/Price 1~4	
RLKB	RLKG		Type	D	L	P	Y	RLKB	RLKG
4	4	2	RLKB (Standard head type)	2	10.0~100.0	0.9~1.9	0.8~1.8	Quotation	
5	6			3		0.9~2.9	0.8~2.8		
6	7	2.5		4		1.1~3.9	1.0~3.8		
7	8	3		5		1.3~4.9	1.2~4.8		
8	9		RLKG (Large head type)	6	15.0~100.0	1.6~5.9	1.5~5.8		
10	11	4		8		2.1~7.9	2.0~7.8		
13	15	5		10		2.6~9.9	2.5~9.8		

P>Y

■L · P · Y · B dimension designation type

H		Part Number		0.1mm increments				U/Price 1~4	
RLKBF	RLKGF	Type	D	L	P	Y	B	RLKBF	RLKGF
4	4	RLKBF (Standard head type)	2	10.0~100.0	0.9~1.9	0.8~1.8	1.0~3.0	Quotation	
5	6		3		0.9~2.9	0.8~2.8	1.0~3.0		
6	7		4		1.1~3.9	1.0~3.8	1.3~3.8		
7	8		5		1.3~4.9	1.2~4.8	1.5~4.5		
8	9	RLKGF (Large head type)	6	15.0~150.0	1.6~5.9	1.5~5.8	1.5~4.5		
10	11		8		2.1~7.9	2.0~7.8	2.0~6.0		
13	15		10		2.6~9.9	2.5~9.8	2.5~7.5		

P>Y

Order

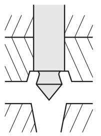
Part Number	—	L	—	P	—	Y	—	B
RLKL 3	—	37.5						
RLKG 4	—	37.5	—	P2.8	—	Y2.3		
RLKGF4	—	37.5	—	P2.8	—	Y2.3	—	B3.0

Days to Ship Quotation

Price Quotation

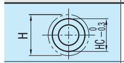
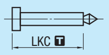
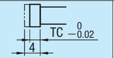
Example

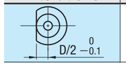
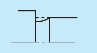
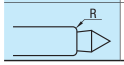
※**Characteristics of cone-shaped tip type**
- Runner cooling time is shortened and pull-out failure is prevented.
- Effective when runner is thick or when cooling is difficult.



Alterations

Part Number — L — P — Y — B — (HC · LKC···etc.)
RLKBF 4 — 37.51 — P2.8 — Y2.3 — B2.4 — HC5 — LKC

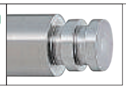
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H	Quotation
	LKC	Changes L dimension tolerance $L^{+0.3}_{+0.1} \cdots\rightarrow L^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.)	
	TC	TC=0.1mm increments 2.0≦TC<4 L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	KC	Single flat cutting ⊗ Not available when L<16	Quotation
	TRN	Adds a relief under the head. (No need for plate chamfering)	
	DR	D dimension end R processing. (R0.1~0.3) About simple processing, it is not precise R shape.	

RUNNER LOCK PINS／RUNNER LOCK PIN COLLARS

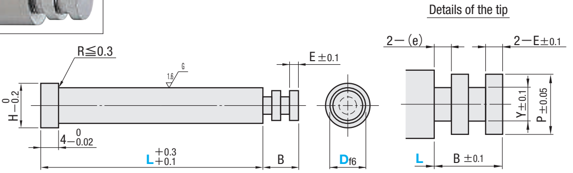
—STRAIGHT, SUPER HARD LOCK TYPE—

Non JIS material definition is listed on P.1351 - 1352



RoHS

Application	Part Number	M	H
Standard head type	RLEL	SKH51	58 ~ 60HRC



■L dimension designation type

H	B	E (e)	P	Y	Part Number		L 0.1mm increments	U/Price
					Type	D		1~4
4	2	0.5	1.9	1	RLEL (Standard head type)	2	10.0~100.0	Quotation
5	2.4	0.6	2.5	1.5		3		
6	3.2	0.8	3.5	2.5		4		
7	4	1	4	3		5		
8	4.8	1.2	5	4		6	15.0~100.0	
10	6	1.5	6	5		8		

Order

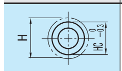
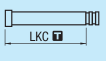
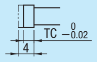
Part Number	—	L
RLEL4	—	50.2

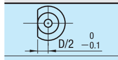
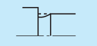
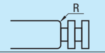
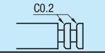
Days to Ship Quotation

Alterations

Part Number — L — (HC · LKC···etc.)
RLEL 4 — 50.25 — LKC

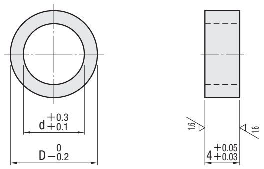
Price Quotation

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H	Quotation
	LKC	Changes L dimension tolerance $L^{+0.3}_{+0.1} \cdots\rightarrow L^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.)	
	TC	TC=0.1mm increments 2.0≦TC<4 L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	KC	Single flat cutting	Quotation
	TRN	Adds a relief under the head. (No need for plate chamfering)	
	DR	D dimension end R processing. (R0.1~0.3) About simple processing, it is not precise R shape.	
	SC	C chamfering (0.2mm) at 2 places of tip	

RoHS

RLC



M S45C
H 48~52HRC

Runner lock pin diameter (D)	D	d	Part Number		U/Price
			Type	No.	1~4
2	7	4	RLC (For standard head type)	2	Quotation
3	8	5		3	
4	9	6		4	
5	10	7		5	
6	12	8		6	
8	14	10		8	
10	17	13		10	

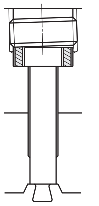
Order

Part Number
RLC 6

Days to Ship Quotation

Price Quotation

Example If the screw plug is tightened excessively, the runner lock pin may incline, leading to a scuffing or flange destruction.
These collars are used to prevent this kind of trouble.



■Applicable Screw Plugs (when using collar)

For details of the screw plug specifications P.1193.

Runner lock pin diameter (D)		Head dia.	Collar size	Applicable Screw Plugs
Standard head	Large head			
2	2	4	RLC 2	MSW10
2.5	—	5	RLC 3	
3	—	5	RLC 3	
4	2.5 · 3	6	RLC 4	※MSW12
5	4	7	RLC 5	※MSW14
6	5	8	RLC 6	※MSW16
8	—	10	RLC 8	※MSW18
10	—	13	RLC 10	※MSW20

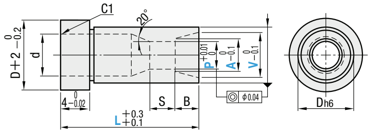
※Fine thread (Pitch1.5)

BUSHINGS FOR RUNNER LOCK PIN

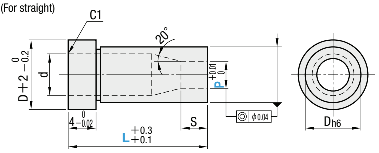
RoHS

M SKD11
H 60〜63HRC

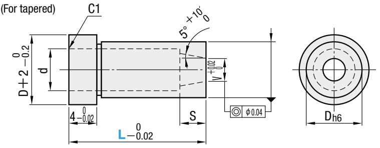
RLBST (For straight, no tapering required)



RLBS (For straight)



RLBT (For tapered)



■Applicable Runner Lock Pins

Part Number			
RLR RLRL RLRB RLRG RLRBF RLRGF	P.799	RLRSB RLRSBF	P.803
		RLREB RLREBF	P.804
RLH RLHL RLHB RLHG RLHBF RLHGF	P.800	RLKL RLKB RLKG RLKBF RLKGF	P.805

■Applicable Runner Lock Pins

Part Number			
RLTB RLTG RLTBF RLTGF	P.801	RHTB RHTG RHTBF RHTGF	P.802

Applicable Screw Plugs	D	d	S	B	Part Number Type	P	L	0.5mm increments A	V	U/Price 1〜4
MSWA10	5	2.5	6	2	RLBST	2	15 20 25	P＜A≦V and A≦D−1.5	A≦V≦D−1.0	Quotation
	6	3.0				2.5	15 20 25			
		3.5				3	10 15 20 25			
MSWA12	8	4.5	8	2.5		4	15 20 25			
		5.5		3		5				
MSWA16	10	6.5				6	15 20 25 30			
MSWA18	13	8.5		4		8				
MSWA20	15	10.5		5		10	25 30			

P dimension corresponds to the applicable runner pin's D dimension.

Applicable Screw Plugs	D	d	S	Part Number Type	P	L	U/Price 1〜4
MSWA10	6	3.5	6	RLBS	3	10 15	Quotation
MSWA12	8	4.5			4	10 15 25	
		5.5			5	10	
MSWA16	10	6.5	8		6	15 20 25 30	
MSWA18	13	8.5			8	25	

P dimension corresponds to the applicable runner pin's D dimension.

Applicable Screw Plugs	D	d	S	V	Part Number Type	No.	L	U/Price 1〜4
MSWA12	8	4.5	4	3.0	RLBT	4	15 20 25	Quotation
		5.5	5	3.5		5	10 15 20 25	
MSWA16	10	6.5	7	4.0		6	15 20 25	

No. corresponds to the applicable runner pin's D dimension.

Order

Part Number	—	L	—	A	—	V
RLBST8	—	20	—	A9.0	—	V11.0
RLBS 8	—	25				

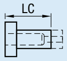
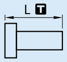
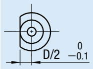
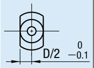
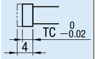
Days to Ship Quotation

Price Quotation

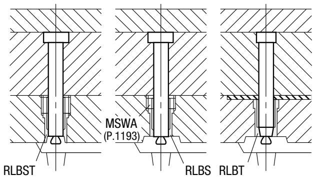
Alterations

Part Number	—	L(LC)	—	A	—	V	—	(LKC・KC···etc.)
RLBST6	—	LC22.3	—	A7.0	—	V9.0	—	LKC

Days to Ship: Quotation

Alterations	Code	Spec.	1Code
	LC	Full length alteration Lmin.≦LC＜L 0.1mm increments S becomes shorter by (L−LC). S≧1 ⊗ Not available for RLBT.	Quotation
	LKC	Changes L dimension tolerance $L^{+0.3}_{+0.1}$ ···› $L^{+0.02}_{0}$ (L dimension designation in 0.01mm increments possible.) ⊗ L＜16 not available. ⊗ Not available for RLBT.	
	KC	Adds a single key flat on the head ⊗ Not available when L＜16	
	WKC	Adds two parallel key flats on the head. ⊗ Not available when L＜16	
	TC	Head tickness change 2.0≦TC＜4 0.1mm increments L dimension becomes shorter by (4−TC). When combined with LC, L dimension is equal to LC.	

Example



Characteristics of RLBST

Since undercut part of the runner lock pin is processed not to project into runner, no tapering is necessary to the plate.

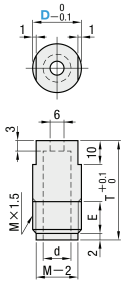
RUNNER EJECTOR SETS

Non JIS material definition is listed on P.1351 - 1352

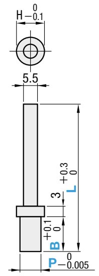
RoHS

RES

①Housing



②Pin



①Housing
M SCM435
H 33〜38HRC

②Pin
M SK95 (Old SK4)
H 53〜58HRC

① Housing					② Pin				③ Spring	
D	M	d	E	T	H	P	B	L	Type/Dia.−Free length	Spring constant
14	M14	9	10	26	8	6	10	35 40	WF 8−25 WFH8−25 WL 8−25 WLH8−25	WF=0.05 WFH=0.05 WL=0.1 WLH=0.1 (Details P.1224 P.1225 P.1231)
							15	40 45 50 60		
16	M16	11	12	35	10	8	23	50 55 60 65 70	WF 8−30 WFH8−30 WL 8−30 WLH8−30	
							28	60 65 75 80		
18	M18	13	12	35	12	10	33	70 85		
							38	85		

Part Number Type	P	B	L	Spring	U/Price 1〜4 Spring WF・WL	Spring WFH・WLH
RES ①② ③ Set	6	10	35 40	WF WFH WL WLH	Quotation	
		15	40 45 50 60			
	8	23	50 55 60 65 70			
		28	60 65 75 80			
	10	33	70 85			
		38	85			

■①Housing only

P Application pin dia.	T	Part Number Type	D	U/Price 1〜4
6	26	RESA	14	Quotation
8	35		16	
10	35		18	

■②Pin only

Part Number Type	P	B	L	U/Price 1〜4
RESB	6	10	35 40	Quotation
		15	40 45 50 60	
	8	23	50 55 60 65 70	
		28	60 65 75 80	
	10	33	70 85	
		38	85	

※Choices of the pin's P and B dimensions, as well as S (runner protrusion), W (runner stopper plate taping depth) are provided in accordance with the thickness of runner stopper plates (T_2). Select the appropriate size from the table below.

■Set Selections

	Pin														Set			
T_1 / T_2	Set type: A							Set type: B							P	B	W	S
	25	30	35	40	45	50	60	20	25	30	35	40	45	50	60				
15	35	40	45	50		60		35	40	45	50	55		65		6	10	10	5
20	40	45	50	55		65	75		45	50	55	60		70	80		15		
25		50	55	60	65	70	80			55	60	65	70	75	85	8	23	12	10
30			60	65	70	75	85				65	70	75	80			28		
35				70	75	80						75	80	85		10	33		
40						85								90	100		38		

Notes
- When tapping a W deep hole, keep its bottom's incomplete thread 3mm or less.
- Tighten the runner ejector set firmly using a spanner on the housing's notch. This forces the housing's flat bottom surface to be pressed hard on the tap hole bottom, and helps prevent the runner ejector set from loosening.

Order

Part Number	—	B	—	L	—	Spring
RES6	—	10	—	40	—	WF

- Housing only

Part Number
RESA14

- Pin only

Part Number	—	B	—	L
RESB6	—	10	—	40

※For details of springs (WF/WL/WFH/WLH), refer to P.1224, 1225, and 1231.

Days to Ship Quotation

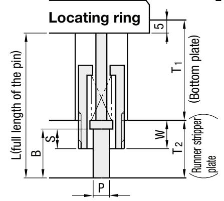
Price Quotation

Example

Set type: A

Held down with a locating ring
- Make a 5mm slot on the bottom plate and set the locating ring in it.

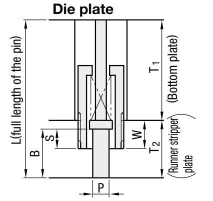
・$L=T_1+T_2-5$



Set type: B

Held down with the molding machine's die plate
- Set the runner ejector set not to interfere with the die plate holes.

・$L=T_1+T_2$



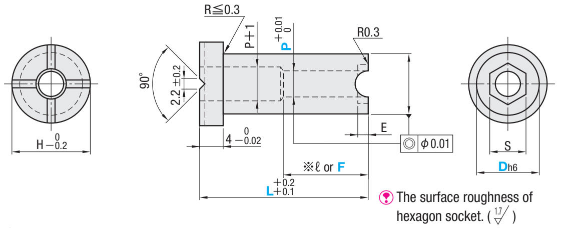
RUNNER CHANGE PINS

—FOR Z PIN COMBINATION　L DIMENSION SELECTION・L DIMENSION DESIGNATION TYPE—

RoHS

Type (Select the runner groove shape from the drawings below)

RCPNZ (L dimension selection type)
RCPLZ (L dimension designation type)



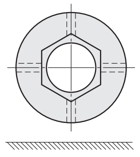
The surface roughness of hexagon socket. ($\overset{1.7}{\bigtriangledown}$)

M SKD61
H 48～52HRC

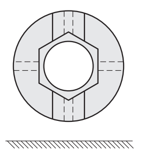
※ℓ =L dimension selection type
F=L dimension designation type

Shape 1　Top shape (The plunger groove is provided in the same direction as the runner groove.)

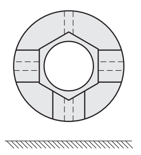
N (No groove)



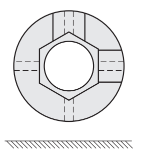
I



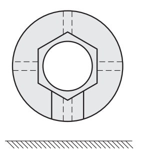
T



K

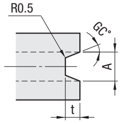


L



Shape 2　Side shape

Shape A (Trapezoid)



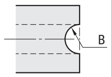
● A dimension selection

Applicable D dimension	A	t	GC°
10・13・16	3	2.5	
13・16	4	3	7
16	5	3.5	10
	6	4	

Available to select the trapezoidal taper angle (GC°).
For details, refer to the Alterations column at lower right.

- Without GC, taper angle is 10°　.
- Not available for D8
- When Shape 1 is T and K, A5 and A6 are impossible to process for the hexagonal wrench fitness get worse.

Shape B (Semicircle)

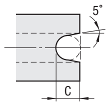


● B dimension selection

Applicable D dimension	B
8・10・13・16	1
	1.25
	1.5
10・13・16	1.75
	2
	2.25
	2.5
13・16	3
16	3.5
	4

- When Shape 1 is T and K, B3～4 are impossible to process for the hexagonal wrench fitness get worse.

Shape C (Arc＋Tangent)



● C dimension selection

Applicable D dimension	C
8・10・13・16	2
10・13・16	2.5
13・16	3
16	3.5
	4

- When Shape 1 is T and K, C3.5 and C4 are impossible to process for the hexagonal wrench fitness get worse.

Non JIS material definition is listed on P.1351 - 1352

■L dimension selection・L dimension designation type

Applicable plungers	H	E	S	Part Number		Shape1	Shape2			L	ℓ or F		P
				Type	D		A	B	C		RCPNZ ℓ	RCPLZ F (1mm increments)	
BPJ4 BSJ4	14	3	4	RCPNZ (L dimension selection) RCPLZ (L dimension designation)	8	N I *T *K L	—	1 1.25 1.5	2	RCPNZ L dimension selection type 20 25 30 35 40 50 RCPLZ L dimension designation type 0.1mm increments 15.0～50.0	12	7～30	3
	16		5		10		3	1 1.25 1.5 1.75 2 2.25 2.5	2 2.5		13		4
BPJ5 BSJ5	19	4	6		13		3 4	1 1.25 1.5 1.75 2 2.25 2.5 *3	2 2.5 3	RCPNZ L dimension selection type 20 25 30 35 40 50 60 RCPLZ L dimension designation type 0.1mm increments 20.0～60.0	14	7～30	5
			8							RCPNZ L dimension selection type 25 30 35 40 50 60 RCPLZ L dimension designation type 0.1mm increments 20.0～60.0	18		6
	22	5	10		16		3 4 *5 *6	1 1.25 1.5 1.75 2 2.25 2.5 *3 *3.5 *4	2 2.5 3 *3.5 *4	RCPNZ L dimension selection type 30 35 40 50 60 RCPLZ L dimension designation type 0.1mm increments 20.0～60.0	20	7～30	8

When Shape 1 is *T・*K, A5　6・B3　4・C3.5　4 are impossible to process.　See P.651 for specifications of the applicable plungers.
When N is selected for Shape 1, no need to designate Shape 2.

Order

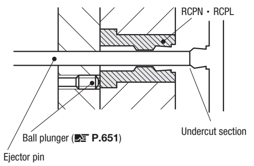
Part Number	Shape1	Shape2	L	F	P
RCPNZ13	I	C2.5	30		P5
RCPLZ13	I	C2.5	30	F20	P6

Days to Ship Quotation

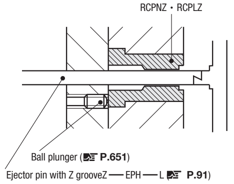
Price Quotation

Example

[Conventional products]



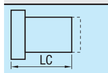
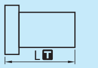
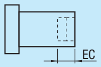
[For Z Pin combination]



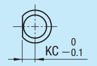
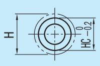
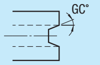
Effective to prevent resin powders from being mixed in the products. When the resin with a high transparency etc. are used, it will generate chipping powder when the resin of undercut part is releasing from the mold. Moreover, the runner groove direction can be changed from the PL side using a hexagonal wrench as well as conventional products.
Please use a ball plunger for positioning.

Alterations

Part Number	Shape1	Shape2	L(LC)	F	P	(LKC・HC・EQ…etc.)
RCPNZ13	I	C2.5	LC28.01		P5	LKC—EC5
RCPLZ13	T	A3	30.1	F20	P6	GC7

Alterations	Code	Spec.	1Code
	LC	Full length alteration　0.1mm increments 20＜LC＜Lmax.　Available for L dimension selection type. When combination with LKC, LC=0.01mm increments possible. ℓ becomes shorter by (L—LC). ℓ≧N＋1	Quotation
	LKC	Changes L dimension tolerance L$^{+0.2}_{+0.1}$ ⋯→ L$^{0}_{-0.02}$ When L dimension designation, L dimension designation in 0.01mm increments possible.	
	EC	Changes the groove depth E dimension of hexagonal wrench.	

D	EC dimension selection
8・10	4・5
13	3・5
16	3・4

Alterations	Code	Spec.	1Code
	KC	Single flat cutting KC=D/2 Designation method KC KC position ・Shape 1 Please confirm it with Top shape.	Quotation
	HC	Changes head diameter D≦HC＜H 0.1mm increments	
	GC	Shape2 A shape taper angle (GC°) change GC° selection　10°　7° Designation method 10° ⋯→ GC10　7° ⋯→ GC7 Not available for D8	

RUNNER CHANGE PINS

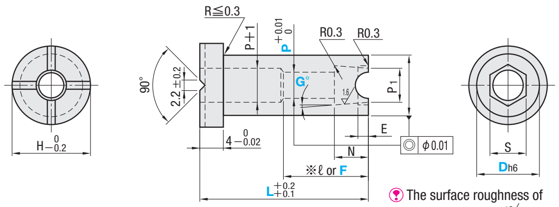
—FOR EJECTOR PINS L DIMENSION SELECTION TYPE • L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type (Select the runner groove shape from the drawings below)

RCPN (L dimension selection type)
RCPL (L dimension designation type)



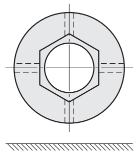
The surface roughness of hexagon socket. ($\sqrt[1.7]{}$)

※ ℓ=L dimension selection type
F=L dimension designation type

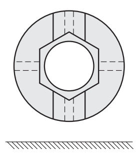
M SKD61
H 48～52HRC

Shape 1 Top shape(The plunger groove is provided in the same direction as the runner groove.)

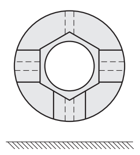
N (No groove)



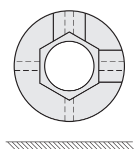
I



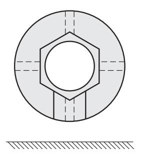
T



K

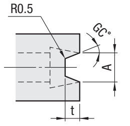


L



Shape 2 Side shape

Shape A (Trapezoid)

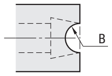


● **A dimension selection**

Applicable D dimension	A	t	GC°
10 • 13 • 16	3	2.5	7 10
13 • 16	4	3	
16	5	3.5	
	6	4	

Available to select the trapezoidal taper angle (GC°).
For details, refer to the Alterations column at lower right.
Without GC, taper angle is 10°.
⊗ Not available for D8
⊗ When Shape 1 is T and K, A5 and A6 are impossible to process for the hexagonal wrench fitness get worse.

Shape B (Semicircle)

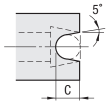


● **B dimension selection**

Applicable D dimension	B
8 • 10 • 13 • 16	1
	1.25
	1.5
10 • 13 • 16	1.75
	2
	2.25
	2.5
13 • 16	3
16	3.5
	4

⊗ When Shape 1 is T and K, B3～B4 are impossible to process for the hexagonal wrench fitness get worse.

Shape C (Arc+Tangent)



● **C dimension selection**

Applicable D dimension	C
8 • 10 • 13 • 16	2
10 • 13 • 16	2.5
13 • 16	3
16	3.5
	4

⊗ When Shape 1 is T and K, C3.5 and C4 are impossible to process for the hexagonal wrench fitness get worse.

■L dimension selection・L dimension designation type

Applicable plungers	H	E	P1	S	N	Part Number		Shape1	Shape2			L	ℓ or F		P	G°
						Type	D		A	B	C		RCPN ℓ	RCPL F (1mm increments)		
BPJ4 BSJ4	14	3	3.5	4	6	RCPN (L dimension selection) RCPL (L dimension designation)	8	N I *T *K L	—	1 1.25 1.5	2	RCPN L dimension selection type 20 25 30 35 40 50 RCPL L dimension designation type 0.1mm increments 15.0～50.0	12	8～30	3	0 1 2 3 4 5
	16		4.6	5			10		3	1 1.25 1.5 1.75 2 2.25 2.5	2 2.5		13		4	
BPJ5 BSJ5	19	4	5.8	6	8		13		3 4	1 1.25 1.5 1.75 2 2.25 2.5 *3	2 2.5 3	RCPN L dimension selection type 20 25 30 35 40 50 60 RCPL L dimension designation type 0.1mm increments 20.0～60.0	14	10～30	5	
			6.8	8								RCPN L dimension selection type 25 30 35 40 50 60 RCPL L dimension designation type 0.1mm increments 20.0～60.0	18		6	
	22	5	9	10	10		16		3 4 *5 *6	1 1.25 1.5 1.75 2 2.25 2.5 *3 *3.5 *4	2 2.5 3 *3.5 *4	RCPN L dimension selection type 30 35 40 50 60 RCPL L dimension designation type 0.1mm increments 20.0～60.0	20	12～30	8	

⊗ When Shape 1 is *T • *K, • A5 6 • B3 4 • C3.5 4 are impossible to process. See P.651 for specifications of the applicable plungers.
⊗ When N is selected for Shape 1, no need to designate Shape 2.

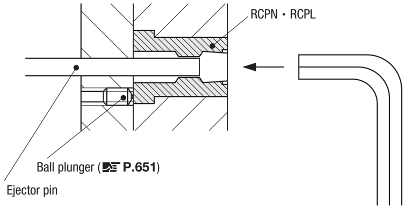
Order

Part Number	Shape1	Shape2	L	F	P	G
RCPN13	I	C2.5	30		P5	G2
RCPL13	I	C2.5	31.2	F20	P6	G3

Days to Ship Quotation

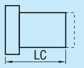
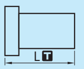
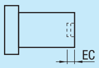
Price Quotation

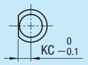
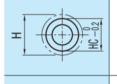
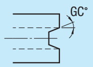
Example The runner groove direction can be changed from the PL side using a hexagonal wrench.
Please use a ball plunger for positioning.



Alterations

Part Number	Shape1	Shape2	L(LC)	F	P	G	(LKC • HC • EQ···etc.)
RCPN13	I	C2.5	LC28.01		P5	G2	LKC—EC5
RCPL13	I	A4	31.2	F20	P6	G3	GC7

Alterations	Code	Spec.	1Code
	LC	Full length alteration 0.1mm increments 20<LC<Lmax. Available for L dimension selection type. When combined with LKC, LC=0.01mm increments possible. ℓ becomes shorter by (L−LC). ℓ≧N+1	Quotation
	LKC	Changes L dimension tolerance $L^{+0.2}_{+0.1}$ ···› $L^{0}_{-0.02}$ When L dimension designation, L dimension designation in 0.01mm increments possible.	
	EC	Changes the groove depth E dimension of hexagonal wrench. D 8 • 10: EC dimension selection 4 • 5 D 13: EC dimension selection 3 • 5 D 16: EC dimension selection 3 • 4	

Alterations	Code	Spec.	1Code
	KC	Single flat cutting KC=D/2 Designation method KC KC position • Shape 1 Please confirm it with Top shape.	Quotation
	HC	Changes head diameter D≦HC<H 0.1mm increments	
	GC	Shape2 A shape taper angle (GC°) change GC° selection 10° 7° Designation method 10° ···› GC10 7° ···› GC7 ⊗ Not available for D8	

RUNNER CHANGE PINS

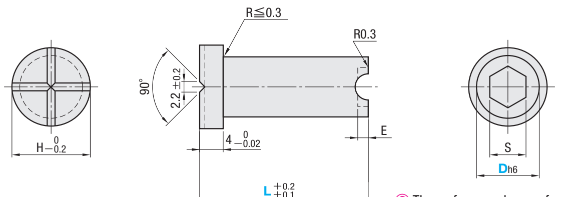
—FOR FIXED SIDE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type (Select the runner groove shape from the drawings below)

RCPK



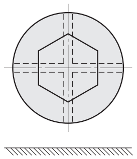
The surface roughness of hexagon socket. ($\sqrt{1.6}$)

M SKD61

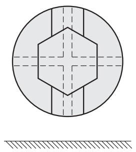
H 48～52HRC

Shape 1 Top shape (The plunger groove is provided in the same direction as the runner groove.)

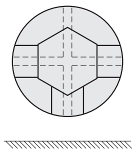
N (No groove)



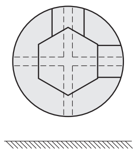
I



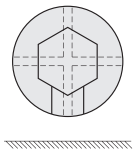
T



K

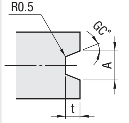


L



Shape 2 Side shape

Shape A (Trapezoid)



● A dimension selection

Applicable D dimension	A	t	GC°
10・13・16	3	2.5	
13・16	4	3	7
16	5	3.5	10
	6	4	

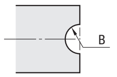
Available to select the trapezoidal taper angle (GC°).
For details, refer to the Alterations column at lower right.

Without GC, taper angle is 10°.

⊗ Not available for D8

⊗ When Shape 1 is T and K, A5 and A6 are impossible to process for the hexagonal wrench fitness get worse.

Shape B (Semicircle)

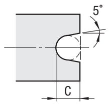


● B dimension selection

Applicable D dimension	B
8・10・13・16	1 1.25 1.5
10・13・16	1.75 2 2.25 2.5
13・16	3
16	3.5 4

⊗ When Shape 1 is T and K, B3～B4 are impossible to process for the hexagonal wrench fitness get worse.

Shape C (Arc＋Tangent)



● C dimension selection

Applicable D dimension	C
8・10・13・16	2
10・13・16	2.5
13・16	3
16	3.5 4

⊗ When Shape 1 is T and K, C3.5 and C4 are impossible to process for the hexagonal wrench fitness get worse.

Applicable plungers	H	E	S	Part Number		Shape1	Shape2			L
				Type	D		A	B	C	
BPJ4 BSJ4	14	3	4	RCPK	8	N I *T *K L	—	1 1.25 1.5	2	15 20 25 30 35 40 50
	16		5		10		3	1 1.25 1.5 1.75 2 2.25 2.5	2 2.5	
BPJ5 BSJ5	19	4	6		13		3 4	1 1.25 1.5 1.75 2 2.25 2.5 *3	2 2.5 3	15 20 25 30 35 40 50 60
	22	5	10		16		3 4 *5 *6	1 1.25 1.5 1.75 2 2.25 2.5 *3 *3.5 *4	2 2.5 3 *3.5 *4	15 20 25 30 35 40 50 60

See P.651 for specifications of the applicable plungers.

⊗ When Shape 1 is *T・*K, ・A5 6・B3 4・C3.5 4 are impossible to process.

⊗ When N is selected for Shape 1, no need to designate Shape 2.

Order

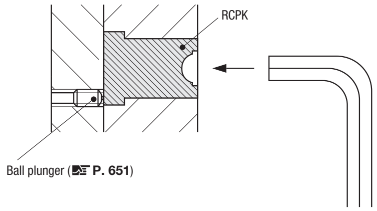
Part Number	—	Shape1	—	Shape2	—	L
RCPK13	—	I	—	C2.5	—	30

Days to Ship Quotation

Price Quotation

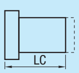
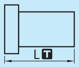
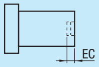
Example

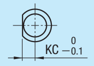
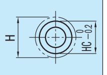
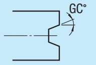
The runner groove direction can be changed from the PL side using a hexagonal wrench.
Please use a ball plunger for positioning.



Alterations

Part Number	—	Shape1	—	Shape2	—	L(LC)	—	(LKC・HC・EQ···etc.)
RCPK13	—	I	—	C2.5	—	LC28.01	—	LKC—EC5
RCPK16	—	L	—	A3	—	20	—	GC7

Alterations	Code	Spec.	1Code
	LC	Full length alteration 15＜LC＜Lmax. 0.1mm increments When combined with LKC, LC＝0.01mm increments possible	Quotation
	LKC	Changes L dimension tolerance L$^{+0.2}_{+0.1}$ ···› L$^{0}_{-0.02}$	
	EC	Changes the groove depth E dimension of hexagonal wrench. D / EC dimension selection 8・10 / 4・5 13 / 3・5 16 / 3・4	

Alterations	Code	Spec.	1Code
	KC	Single flat cutting KC＝D/2 Designation method KC KC position ・Shape 1 Please confirm it with Top shape.	Quotation
	HC	Changes head diameter D≦HC＜H 0.1mm increments	
	GC	Shape2 A shape taper angle (GC°) change GC° selection 10° 7° Designation method 10° ···› GC10 7° ···› GC7 ⊗ Not available for D8	

ADJUSTABLE PINS FOR RUNNER FLOW

—GUIDE—

■Runner flow rate adjustment pin

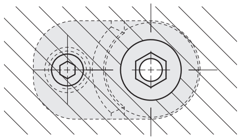
In the case of a multi-cavity mold, or a dual cavity mold, a difference in the filling time of each cavity tends to occur depending upon the runner balance. Normally, if a difference in the filling time occurs, the filling times can be equalized by adjusting the runner diameter. To adjust the runner diameter, it is necessary to either additionally form the runner to make it thicker, or to divide the cavity insert, which takes much time and is troublesome.

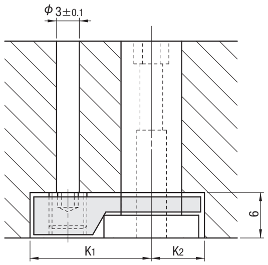
The runner flow rate adjustment pin is a product that facilitates adjustment of the runner flow rate when it is incorporated in the mold.
It is recommended that you use it with a multi-cavity mold or a dual cavity mold.

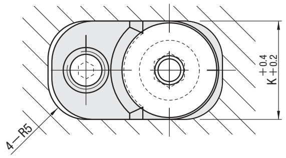
■Features

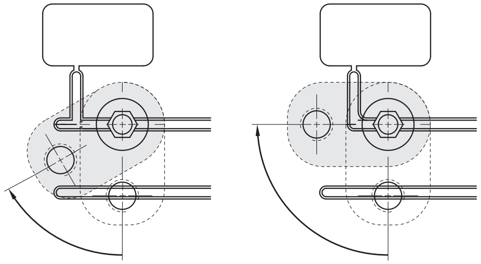
- When incorporated in the mold, the pin enables the flow rate to be adjusted from the parting face. You can use it to adjust the flow rate during a molding try.
- When using this pin with a multi-cavity mold, it is possible not only to adjust the flow rate but also to stop and restart the flow of resin to a specific cavity.
- When using this pin with a dual cavity mold, use it as both a flow rate adjustment pin and a runner change pin.

■ Installation size







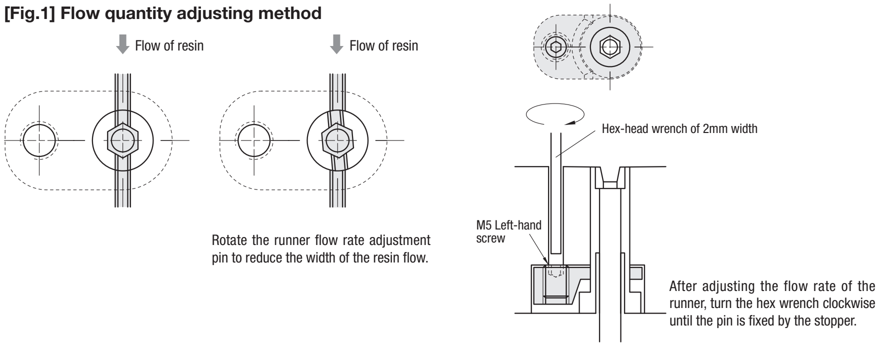


If there is a runner, for example, at the mounting position, and the wrench hole of the stopper interferes with it, change the mounting position of the stopper.

D	K	K_1	K_2
8	13	16	7
10	15	17	8
13	18	19	10(9.5)
16	21	20	11

Example

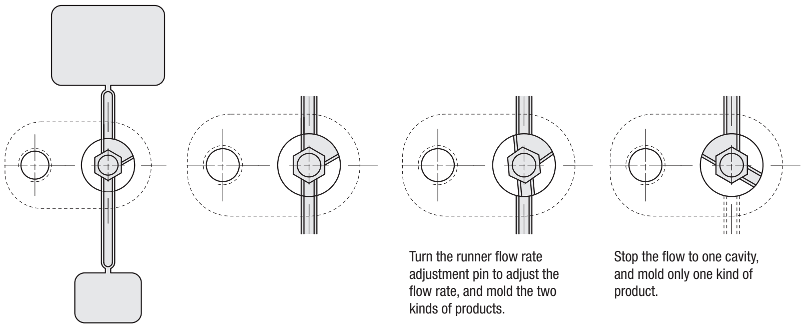
[Fig.1] Flow quantity adjusting method



Rotate the runner flow rate adjustment pin to reduce the width of the resin flow.

After adjusting the flow rate of the runner, turn the hex wrench clockwise until the pin is fixed by the stopper.

[Fig.2] Dual cavity mold (Y-shaped)

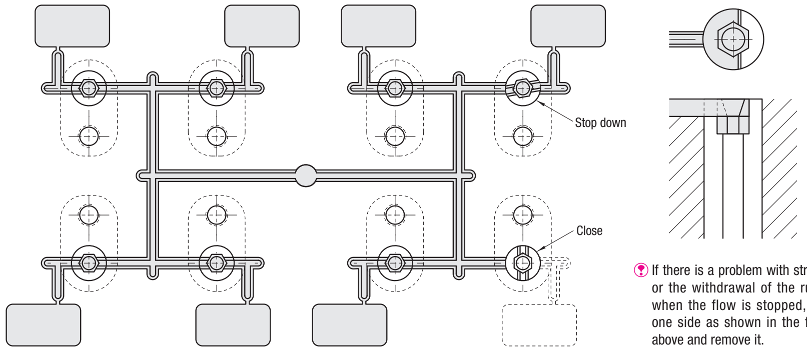


Turn the runner flow rate adjustment pin to adjust the flow rate, and mold the two kinds of products.

Stop the flow to one cavity, and mold only one kind of product.

[Fig.3] Multi-cavity mold

Install a runner flow rate adjustment pin near the gate of each cavity, adjust the flow rate, or stop the flow to a specific cavity.



If there is a problem with strength or the withdrawal of the runner when the flow is stopped, form one side as shown in the figure above and remove it.

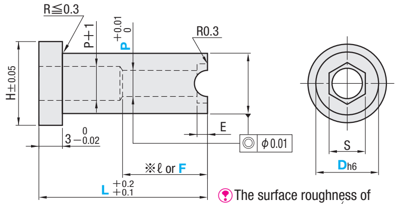
ADJUSTABLE PINS FOR RUNNER FLOW

Non JIS material definition is listed on P.1351 - 1352

RoHS

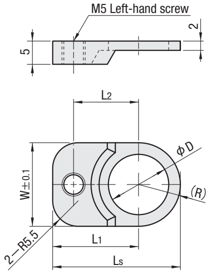
Type (Select the runner groove shape from the drawings below)

RFAN(L dimension selection type)
RFAL (L dimension designation type)



The surface roughness of hexagon socket. (1.7)

■Stopper



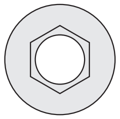
※ℓ=L dimension selection type
F=L dimension designation type

Pin M SKD61
H 48～52HRC

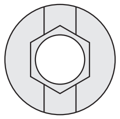
Stopper M SKD61 equivalent
A M5 Left-hand screw special screw plug

Shape 1 Top shape

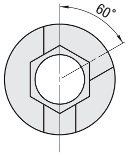
N (No groove)



I

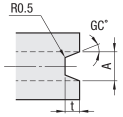


Y



Shape 2 Side shape

Shape A (Trapezoid)



● A dimension selection

Applicable D dimension	A	t	GC°
10・13・16	3	2.5	
13・16	4	3	7
16	5	3.5	10
	6	4	

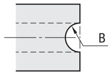
Available to select the trapezoidal taper angle (GC°). For details, refer to the Alterations column at lower right.

Without GC, taper angle is 10°.

⊗ Not available for D8

⊗ When Shape 1 is Y, A5 and A6 are impossible to process for the hexagonal wrench fitness get worse.

Shape B (Semicircle)

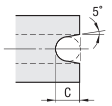


● B dimension selection

Applicable D dimension	B
8・10・13・16	1 1.25 1.5
10・13・16	1.75 2
13・16	2.25 2.5 3
16	3.5 4

⊗ When Shape 1 is Y, B3～B4 are impossible to process for the hexagonal wrench fitness get worse.

Shape C (Arc＋Tangent)



● C dimension selection

Applicable D dimension	C
8・10・13・16	2
10・13・16	2.5
13・16	3
16	3.5 4

⊗ When Shape 1 is Y, C3.5 and C4 are impossible to process for the hexagonal wrench fitness get worse.

■L dimension selection・L dimension designation type

Stopper				H	E	S	Part Number		Shape1	Shape2			L	ℓ or F		P
W	Ls	L1	L2				Type	D		A	B	C		RFAN ℓ	RFAL F (1mm increments)	
13	22	15.5	11	12.5	3	4	RFAN (L dimension selection) RFAL (L dimension designation)	8	N I *Y	—	1 1.25 1.5	2	RFAN L dimension selection type 20 25 30 35 40 50 RFAL L dimension designation type 0.1mm increments 15.0～50.0	12	8～30	3
15	24	16.5	12	14.5		5		10		3	1 1.25 1.5 1.75 2	2 2.5		13		4
18	27.5	18.5	14	17.5	4	6		13		3 4	1 1.25 1.5 1.75 2 2.25 2.5 *3	2 2.5 3	RFAN L dimension selection type 20 25 30 35 40 50 60 RFAL L dimension designation type 0.1mm increments 20.0～60.0	14	10～30	5
						8							RFAN L dimension selection type 25 30 35 40 50 60 RFAL L dimension designation type 0.1mm increments 20.0～60.0	18		6
21	30	19.5	15	20.5	5	10		16		3 4 *5 *6	1 1.25 1.5 1.75 2 2.25 2.5 *3 *3.5 *4	2 2.5 3 *3.5 *4	RFAN L dimension selection type 30 35 40 50 60 RFAL L dimension designation type 0.1mm increments 20.0～60.0	20	12～30	8

⊗ When Shape 1 is Y, A5 6・B3 4・C3.5 are impossible to process.
⊗ When Shape 1 is N, no need to designate Shape 2.

Order

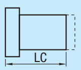
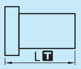
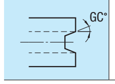
Part Number	—	Shape1	—	Shape2	—	L	—	F	—	P
RFAN13	—	I	—	C2.5	—	30			—	P5
RFAL13	—	I	—	C2.5	—	31.2	—	F20	—	P6

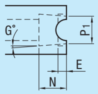
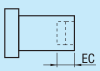
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	Shape1	—	Shape2	—	L(LC)	—	F	—	P	—	(LKC・GC・EQ・SL・EC)
RFAN13	—	I	—	C2.5	—	LC28.01			—	P5	—	LKC
RFAL13	—	I	—	A4	—	31.2	—	F20	—	P6	—	GC7

Alterations	Code	Spec.	1Code
	LC	Full length alteration 0.1mm increments 20＜LC＜Lmax. Available for L dimension selection type. When combined with LKC, LC=0.01mm increments possible. ℓ becomes shorter by (L−LC). ℓ≧N+1	Quotation
	LKC	Changes L dimension tolerance $L^{+0.2}_{+0.1}$ ···→ $L^{0}_{-0.02}$ When L dimension designation, L dimension designation in 0.01mm increments possible.	
	GC	Shape2 A shape taper angle (GC°) change GC° selection 10° 7° Designation method 10° ···→ GC10 7° ···→ GC7 ⊗ Not available for D8	

Alterations	Code	Spec.	1Code
	SL	Processing on the sprue lock Designation method SL−G1 G=1° increments 0≦G≦5 (table below)	Quotation
	EC	Changes the groove depth E dimension of hexagonal wrench. (table below)	

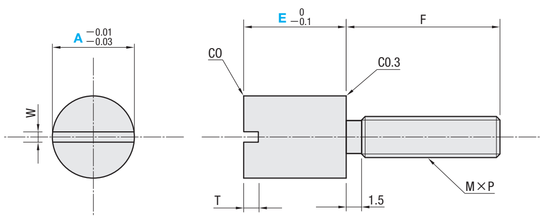
P	P1	N	E
3	3.5	6	3
4	4.6		
5	5.8	8	4
6	6.8		
8	9	10	5

D	EC dimension selection
8・10	4・5
13	3・5
16	3・4

ADJUSTMENT BOLTS FOR RUNNER FLOW RATE

RoHS

RRCB


A $^{-0.01}_{-0.03}$
W
E $^{0}_{-0.1}$
F
C0
C0.3
M×P
T
1.5

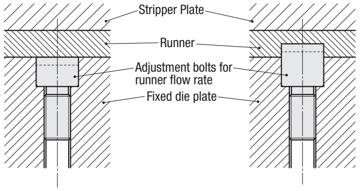
M S45C **H** 33 38HRC
S Black Oxide (Fe_3O_4)

F	M×P	W	T	Part Number Type	Part Number A	E	U/Price 1~4
8	M4×0.7	1.2	2	RRCB	6	4	Quotation
						6	
						8	
12	M6×1.0	1.6	2.5		8	6	
						8	
						10	
16	M8×1.25	2	3		10	8	
						10	
						12	

☎ Order	Part Number — E RRCB6 — 4
Days to Ship	Quotation
Price	Quotation
Example	

■ Characteristics

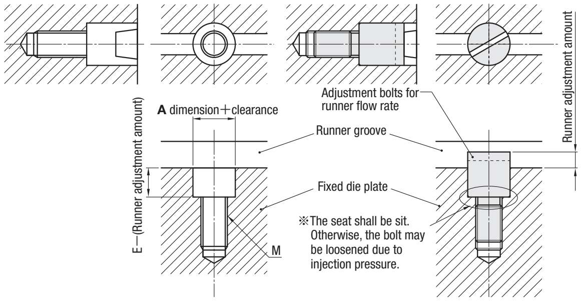
- Can be installed easily with the conventional runner flow rate adjustment pin.
- Runner flow rate can be adjusted with bolt height.
- Both 2-plate and 3-plate can be used.
- Can be installed from either runner side or stripper plate side.
- Set a clearance that creates no burr for installation dimensions of A.
- Designed for runner flow rate adjustment so cannot stop runner completely.
- It is effective to select A dimension wider than the runner width.


Stripper Plate
Runner
Adjustment bolts for runner flow rate
Fixed die plate

Process the installation hole and set a short object of E dimension to prevent resin from entering into it. (RRCB6—4)

Select a long object of E dimension and adjust the runner flow rate. (RRCB6—6)

■ How to Mount

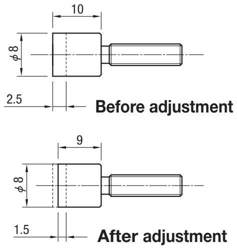

E—(Runner adjustment amount)
A dimension+clearance
Adjustment bolts for runner flow rate
Runner groove
Fixed die plate
M
Runner adjustment amount

※The seat shall be sit. Otherwise, the bolt may be loosened due to injection pressure.

Calculate runner adjustment amount and process the counterbore and tap (M).

Install the runner flow rate adjusting bolt.

■How to adjust (Example : RRCB8—10)

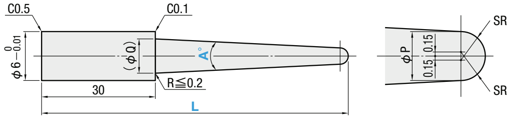

10
ϕ8
2.5
Before adjustment
9
ϕ8
1.5
After adjustment

As T dimension is adjusted to be longer, it is possible to adjust it by about 1mm by cutting the bolt head as indicated above.

ELECTRODES FOR PIN-POINT GATE

—ELECTRODES FOR PIN-POINT GATE— RoHS

EMPG (For SR processing)



Q=2tan $\frac{A}{2}$(L−30−$\sqrt{SR^2+0.15^2}$)+P

M Oxygen free copper (C1020)

*P	SR	Part Number Type	Part Number No.	L	A°	U/Price 1~9 L50~90	U/Price 1~9 L110
0.50	0.40	EMPG	0.8	50 70	1 2 3	Quotation	—
0.70	0.50		1				
0.90	0.60		1.2	50 70 90	1 2 3		Quotation
1.20	0.75		1.5				
1.70	1.00		2	50 70 90	1 2 3		
				110	1 2 3		
2.20	1.25		2.5	50 70 90	1 2 3		
				110	1 2		
2.70	1.50		3	50 70 90	1 2 3		
				110	1 2		
3.20	1.75		3.5	50 70	1 2 3		
				90	1 2		
				110	1		
3.70	2.00		4	50 70	1 2 3		
				90	1 2		
				110	1		

*This electrode is designed for a 0.15mm discharge gap on each side.

Because a center point of SR shifts 0.15mm from the center in one side, P dimension is 0.3mm less than nominal diameter (No.)=(2×SR)

Order

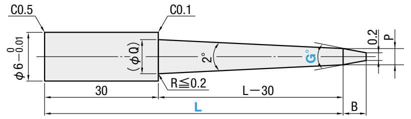
Part Number	—	L	—	A
EMPG3	—	70	—	A2

Days to Ship Quotation

Price Quotation

—ELECTRODES FOR PIN-POINT GATE— RoHS

EMPGA(For gate processing)



Q=2tan 1° (L−30) +P

M Oxygen free copper (C1020)

*P	Part Number Type	Part Number No.	L	G°	U/Price 1~9 L50~90	U/Price 1~9 L110
0.50	EMPGA	0.8	50 70	20 30 40 50 60	Quotation	
0.70		1				
0.90		1.2	50 70 90			
1.20		1.5				
1.70		2	50 70 90 110			
2.20		2.5				
2.70		3				
3.20		3.5	50 70 90			
3.70		4				

*This electrode is designed for a 0.15mm discharge gap on each side.

P dimension is 0.3mm less than nominal diameter (No.).

■B dimension choices

No.	B G20	B G30	B G40	B G50	B G60
0.8	0.85	0.56	0.41	0.32	0.26
1	1.42	0.93	0.69	0.54	0.43
1.2	1.99	1.31	0.96	0.75	0.61
1.5	2.84	1.87	1.37	1.07	0.87
2	4.25	2.80	2.06	1.61	1.30
2.5	5.67	3.73	2.75	2.14	1.73
3	7.09	4.67	3.43	2.68	2.17
3.5	8.51	5.60	4.12	3.22	2.60
4	9.92	6.53	4.81	3.75	3.03

Order

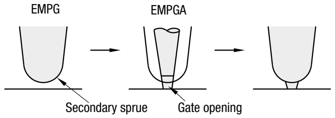
Part Number	—	L	—	G
EMPGA3	—	70	—	G40

Days to Ship Quotation

Price Quotation

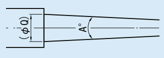
The electrode's tip may be bent if it is dropped or its tip directly touches other objects. If so, make sure to perform dressing before using it for rotating discharge process.

Example



Alterations

Part Number	—	L	—	G	—	(A)
EMPGA3	—	70	—	G40	—	A1

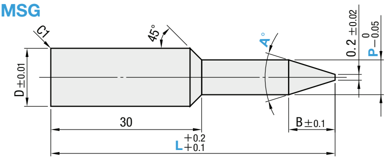
Alterations	Code	Spec.	¥/1Code
	A	Select the taper angle A°, only available for EMPGA. 1° 3° Designation method 1°→A1, 3°→A3 ⊗A3 is not available when L110 for No2.5・3 and L90 for No3.5・4 are chosen.	0

ELECTRODES FOR OBLIQUE GATE

Non JIS material definition is listed on P.1351 - 1352

—ELECTRODES FOR OBLIQUE GATE— RoHS

EMSG



M Tough pitch copper (C1100)

P \ A	B 10°	B 15°	B 20°	B 30°	D	Part Number Type	Part Number P	L	A°	U/Price 1~9
1.5	—	—	3.7	—	6	EMSG	1.5	60	20	Quotation
2	10.3	6.8	5.1	3.4			2	60 70	10 15 20 30	
2.5	13.1	8.7	6.5	4.3			2.5			
3	16.0	10.6	7.9	5.2			3	60 70	10 15 20 30	
								90	20 30	
4	21.7	14.4	10.8	7.1			4	60 70	10 15 20 30	
								90	20	
5	—	—	13.6	9.0			5	60 70	20 30	
								90	20	
6	—	—	16.4	10.8			6	60 70	20 30	
								90	20	
8	—	—	—	14.6	10		8	70	30	

Order

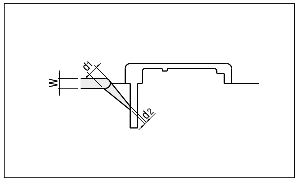
Part Number	—	L	—	A
EMSG2	—	60	—	30

Note that when ordering EMSG, there is no need to enter the letter A of the alphabet.

Days to Ship Quotation

Price Quotation

Example



- Oblique gates require angular hole processing that are often difficult by drilling. Electro discharging is suitable for preparing an angular hole in places where the drill tip would not be well aligned or broken.
- The di dimension is dependent on the runner diameter (W). Select the appropriate P dimension in accordance with d1.

The electrode's tip may be bent if it is dropped or its tip directly touches other objects. If so, make sure to perform dressing before using it for rotating discharge process.

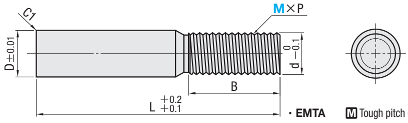
UNDERSIZED TAPPING ELECTRODES

—UNDERSIZED TAPPING ELECTRODES— RoHS

[**EMTWA**] Even a work made of carbide can be processed since it contains tungsten.
(An electric discharging machine capable of using a copper tungsten electrode is required.)

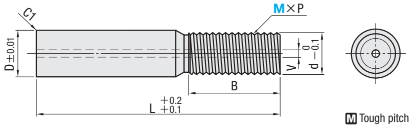
[**EMTB**] Has a through hole for water circulation that enables higher processing speed and helps reduce secondary electric discharge.

EMTA EMTWA



- **EMTA** M Tough pitch copper (C1100)
- **EMTWA** M Tungsten-copper (Cu30%—W)

EMTB(Through hole type)



M Tough pitch copper (C1100)

D	d	P	L	B	V (EMTB only)	Part Number Type	Part Number M	U/Price 1～4 EMTA	U/Price 1～4 EMTB	U/Price 1～4 EMTWA
5	2.2	0.5	50	15	0.5	**EMTA** **EMTB** (Through hole type) **EMTWA** (M3～12)	3	Quotation		
	3.0	0.7			0.7		4			
	3.9	0.8	60	20	1		5			
8	4.7	1.0			1.2		6			
	6.4	1.25			2		8			
12	8.2	1.5	70	30	2.5		10			
	10.0	1.75			3		12			
16	13.6	2.0	80	40	3		16			—
20	17.1	2.5			3		20			—

Order

Part Number
EMTA4

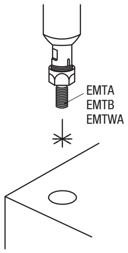
Price Quotation

Days to Ship Quotation

Example

■Undersized Tapping Electrodes

This electrode is used when forming a female thread in hardened steel by electrical discharge machining.



Tip diameter (d) is smaller than the screw size (M). Insert an undersized tapping electrode in the low screw hole (low hole diameter reference value **P.1347**), and perform electrical discharge machining while rocking X and Y directions.

- Swing amount＝M—d—0.1 (Target)
- Clearance for electro discharge＝on one side 0.1～0.5

What is copper tungsten?

■Characteristics

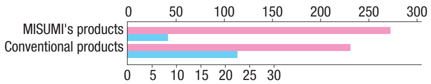
- The composition and alloy structure are optimally adjusted to extend life of an electrode and to raise efficiency of electrical discharge machining at the same time.
- It is possible to increase the machining speed, and reduce the wear of the electrode itself. Tungsten is very hard, permitting accurate electrical discharge machining.

■Characteristic values

Material characteristics	Copper tungsten
Gravity	14.0
Hardness (HRB)	93.5
Conductivity (IACS%)	50
Tensile strength (kgf/mm^2)	60
Transverse rupture strength (kgf/mm^2)	125

■Comparison of machining data

Work: Carbide V3
Machining condition: 14～16μm settings
Machining speed (g/min.) 🟥
Wearout ratio 🟦
*Wear-out ratio＝Wear-out rate of electrode÷Wear-out rate of work



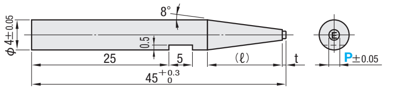
ELECTRODES FOR ENGRAVING

—Round type—

Non JIS material definition is listed on P.1351 - 1352

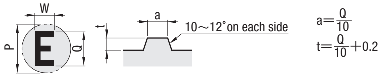
—ROUND TYPE— RoHS

EMLM



M Tough pitch copper (C1100)

■Character size



$a=\frac{Q}{10}$

$t=\frac{Q}{10}+0.2$

ℓ	Q Numerals alphabetical characters	Q < > ／	Q +	W Numerals alphabetical characters	W < >	W + − ／	Part Number Type	Part Number P	Characters for engraving (Round Gothic type)	U/Price 1～9
11.4	0.4	0.36	0.23	0.23	0.185	0.23	EMLM	*0.8A	1234567890 ABCDEFGHI JKLMNOPQR STUVWXYZ Note1 Note2 / > < + −	
11.4	0.6	0.53	0.35	0.3	0.27	0.35		0.8		Quotation
10.7	0.7	0.62	0.41	0.4	0.31	0.41		1.0		
10	1.0	0.88	0.58	0.6	0.44	0.58		1.2		
8.9	1.2	1.06	0.7	0.7	0.53	0.70		1.5		
7.1	1.6	1.42	0.93	1.1	0.71	0.93		2.0		
5.3	2.0	1.77	1.16	1.4	0.89	1.16		2.5		
3.6	2.5	2.22	1.46	1.7	1.11	1.46		3.0		
—	3.5	3.11	2.04	2.4	1.57	2.04		4.0		

Concentricity between the engraving character and the shank is about 0.1.
Note1 : Use ¥ for designating ／ (slash) ; Note2 : Use ＃ for —(minus).

*When 0.8A (P＝0.8), only character size becomes small.

Order

Part Number	—	Characters for engraving
EMLM0.8A	—	A
EMLM2.0	—	¥ (The actual engraved character is ／.)

Price Quotation

Days to Ship Quotation

COMPONENTS OF GATE

COMPONENTS OF GATE

Pin-point Gate Bushings
SKH51

Product Name	Pin-point gate bushing—SKH51 · B dimension selection · SR the inside diameter type—		—SKH51 · B dimension selection · tapered the inside diameter—		—SKH51 · B dimension selection · tip corner acute type—	
Part Number	PGHB□A	PGHBZ□A	PGHBV□A	PGHBVZ□A	PGHBZ□A	PGHBVZ□A
Page	829	829	831	831	833	

Pin-point gate bushing—SKH51 · B dimension selection · SR the inside diameter type—		—SKH51 · B dimension selection · tapered the inside diameter—		—SKH51 · D dimension designation type—		—SKH51 · Large KBtype—	
PGH□A	PGHZ□A	PGHV□A	PGHVZ□A	PGHD□A	PGHDZ□A	PGHF□A	PGHFZ□A
835	835	837	837	839	839	841	841

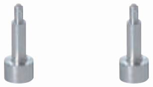
Pin-point Gate Bushing—SKH51 · Inner diameter SR type with head—	—SKH51 · tapered the inside diameter—	—SKH51 Prepared hole type—	—SKH51 · Small diameter type/Small diameter head type—	
PGHT□A	PGHVT□A	PGHTBL	PGHS PGXS	PGHST PGXST
843	845	847	849	850

Pin-point
Gate Bushings

Material
Electroforming

Pin-point Gate Bushing—Electroforming · B dimension selection · SR the inside diameter—		—Electroforming · B dimension selection · tapered the inside diameter—	—Electroforming · B dimension selection · SR the inside diameter—	
PGEB□A	PGKB□A	PGEBV□A	PGE□A	PGK□A
851	851	853	855	855

Pin-point Gate Bushings—Electroforming · B dimension designation · tapered the inside diameter—	—Electroforming · D dimension designation type—		—Electroforming · Head type—	
PGEV□A	PGED□A	PGKD□A	PGET□A	PGKT□A
857	859	859	861	861



Pin-point Gate Bushings—Electroforming · Small diameter type—		—Electroforming · Head type—	
PGES	PGKS	PGEST	PGKST
863	863	864	864

Pin-point
Gate Bushings
Material
Carbide

Pin-point Gate Bushings—Carbide · B dimension selection type—	— Carbide · B dimension designation type—
PGWB□A	PGW□A
865	867

Pin Gate
Extension Bushing
Tunnel Gate
Blanks

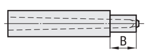
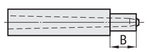
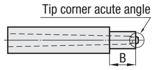
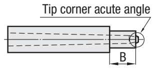
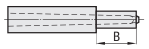
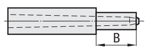
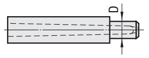
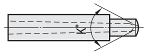
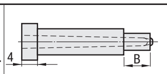
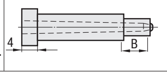
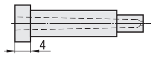
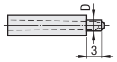
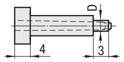
Pin Gate Extension Bushing		—Headless type—	Rolling Gate Cut Units
PGE□	PGE□R	PGEHS PGENS	MRGC
869	869	869	872

GUIDE FOR COMPONENTS OF GATE

—PIN-POINT GATE BUSHING／PIN GATE EXTENSION BUSHINGS／TUNNEL GATE BLANKS—

Non JIS material definition is listed on P.1351 - 1352

■Pin-point gate bushing

Type			Material / Shape	Part Number			
				SKH51	Electro forming		Carbide
					Standard type	High hardness type	
				M SKH51 H 59～61HRC	M Nickel alloy H Inside : 55～60HRC (Depth0.5) Outside : 40～45HRC	M Nickel alloy H 58～62HRC (The inner and outer surface have the same hardness)	M V40 H 87～88HRA (Converted score to Vickers hardness : 960HV)
Normal type	B dimension selection type	SR the inside diameter		**PGHB** (P.829)	**PGEB** (P.851)	**PGKB** (P.851)	**PGWB** (P.865)
		Tapered the inside diameter		**PGHBV** (P.831)	**PGEBV** (P.853)	—	—
	Tip corner acute angled B dimension selection type	SR the inside diameter		**PGHBZ** (P.833)	—	—	—
		Tapered the inside diameter		**PGHBVZ** (P.833)	—	—	—
	B dimension designation type	SR the inside diameter		**PGH** (P.835)	**PGE** (P.855)	**PGK** (P.855)	**PGW** (P.867)
		Tapered the inside diameter		**PGHV** (P.837)	**PGEV** (P.857)	—	—
	D dimension designation type			**PGHD** (P.839)	**PGED** (P.859)	**PGKD** (P.859)	—
	Large K° type			**PGHF** (P.841)	—	—	—
Head type	B dimension selection type	SR the inside diameter		**PGHT** (P.843)	**PGET** (P.861)	**PGKT** (P.861)	—
		Tapered the inside diameter		**PGHVT** (P.845)	—	—	—
	Lower hole type			**PGHTBL** (P.847)	—	—	—
Small diameter type	Nomal type			**PGHS** **PGXS** (P.849)	**PGES** (P.863)	**PGKS** (P.863)	—
	With head type			**PGHST** **PGXST** (P.850)	**PGEST** (P.864)	**PGKST** (P.864)	—
Corresponding resin (Reference)				Resin polycarbonate with glass fiber	Normal resin Un-reinforced resin	Acrylic	Reinforced resin with glass fiber supper engineering plastics

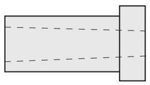
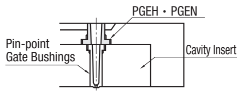
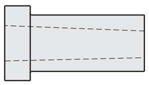
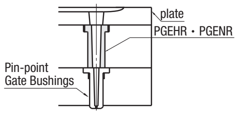
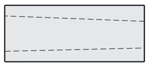
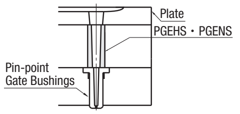
■Features according to the material of the pinpoint gate bushing (For reference)

- **SKH51 (high-speed tool steel)**
  This steel is generally used as the material for pinpoint gate bushings. It is heat-treated and has excellent hardness and wear resistance. In addition, it is tough and can be readily finished to a high degree of accuracy. Because it has been hardened, any alterations must be performed using electric discharging.

- **Electroforming (Nickel Alloy)**
  This material features a gate internal surface that has a fine-textured mirror finish. It reduces the risk of mold-release failure, enabling the taper angle of the gate to be reduced and also realizing a fine gate that can be subjected to a high cycle. However, its wear resistance is inferior to that of the SKH51, so use the SKH51 or a cemented carbide product for molding glass-filled resin or hard resin.

- **Cemented carbide**
  This material is extremely hard, and has very high wear resistance. It can reduce the incidence of deformation or enlargement due to wear of the gate hole during mass-production molding, and also trouble caused by such deformation or enlargement. In the case of a long-life die, this material is particularly effective for improving the stability of gate cutting.

■Pin Gate Extension Bushing

Type	Shape	Catalog page	Part Number		Example
			SKH51	NAK80	
			M SKH51 H 58～60HRC	M NAK80 H 37～43HRC	
Standard type		P.869	**PGEH**	**PGEN**	
Reverse tapered type		P.869	**PGEHR**	**PGENR**	
Headless type		P.869	**PGEHS**	**PGENS**	

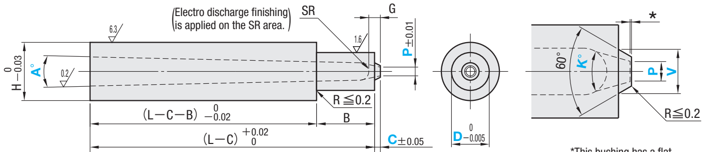
SKH51

PIN-POINT GATE BUSHINGS INNER DIAMETER SR

—B DIMENSION SELECTION TYPE—

RoHS

Shape 1A

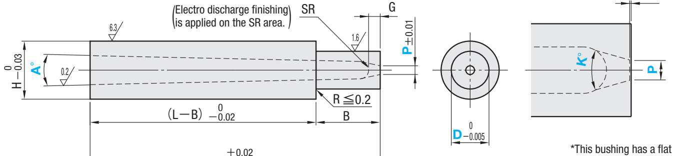

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
C±0.05
L
D 0 −0.005
60°
K°
P
V
*
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

Shape 2A

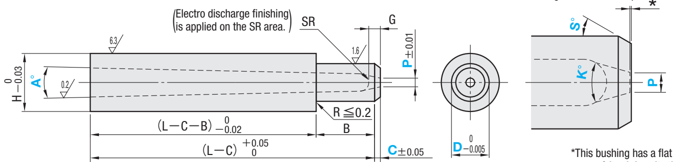

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−B) 0 −0.02
B
L +0.02 0
D 0 −0.005
K°
P
*

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

Shape 3A

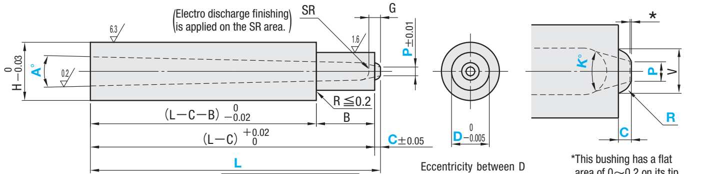

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.005
S°
K°
P
*

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

Shape 4A


Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
C±0.05
L
D 0 −0.005
K°
P
V
C
R
*

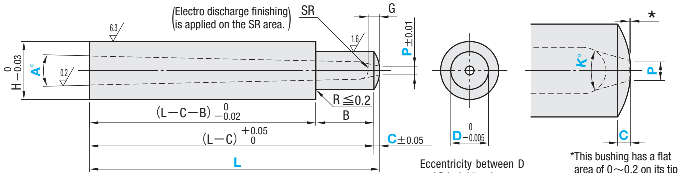
R≧$\sqrt{(P/2)^2+C^2}$ V=2×$\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

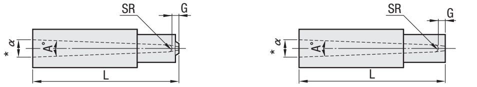
Shape 5A


Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.005
K°
P
C
*

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

- **Calculation for the inlet diameter** $*\alpha$ $*\alpha=2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHB□A	SKH51	59∼61HRC

Non JIS material definition is listed on P.1351 - 1352

Please use the D dimension designation type PGHD (P.839), if D dimension is designated.

H	G	B	SR	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	K°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
3	0.7	3	0.60	PGHB (High-speed steel SKH51)	1A	2	6.00∼20.00	0.3 0.4 0.5(*1)	1	20 30	0.2∼0.4	1.3∼1.9	1∼45	0.4∼0.8
4	1.0	4	0.75			2.5	8.00∼25.00	0.3 0.4 0.5 0.6(*1)			0.2∼0.5	1.5∼2.4		0.6∼1.0
5	1.2	6	1.00		2A	3	10.00∼40.00	0.5 0.6 0.7 0.8 0.9(*2)			0.3∼0.8	2.0∼2.9		0.8∼1.5
6			1.00		3A	4		0.6 0.7	2			2.5∼3.9		
			1.25					0.8 0.9 1.0 1.1 1.2						
8	1.5	10	1.25		4A	5	15.00∼60.00	0.8 0.9 1.0	3		0.5∼1.5	3.5∼4.9		1.0∼2.0
			1.50					1.2 1.3 1.4 1.5(*3)						
9			1.25			6		1.0				4.0∼5.9	1∼50	1.5∼3.0
			1.50					1.2 1.3 1.4 1.5(*3) 1.6(*3)						
11			1.50		5A	8		1.2 1.3 1.4				4.5∼7.9	1∼60	2.0∼4.0
			2.00					1.5 1.6						

(*1) When P0.5(D2)・P0.6(D2.5), K20° can be selected.

(*2) When P0.9(D3) and K30°, G is 1.0.

For shape 4A, R≧$\sqrt{(P/2)^2+C^2}$

(*3) When P1.5・P1.6(D5・D6) and K30°, G is 1.2.

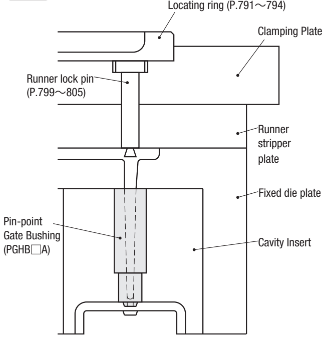
Order

Part Number	L	P	A	K	C V S R
PGHB1A4	20.01	P0.8	A2	K30	C0.5−V3.0
PGHB2A4	20.01	P0.8	A2	K30	
PGHB3A4	20.01	P0.8	A2	K30	C0.5−S30
PGHB4A4	20.01	P0.8	A2	K30	C0.5−R1.0
PGHB5A4	20.01	P0.8	A2	K30	C0.5

Days to Ship Quotation

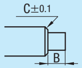
Price Quotation

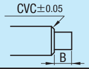
Example


Locating ring (P.791∼794)
Clamping Plate
Runner lock pin (P.799∼805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGHB□A)
Cavity Insert

Alterations

Part Number	L	P	A	K	C V S R	(CC・CVC)
PGHB1A4	20.01	P0.8	A2	K20	C0.5−V3.0	CVC0.3

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D2・2.5 → C0.2 D3・4 → C0.3 D5∼8 → C0.5	Quotation

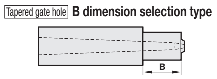
Alterations	Code	Spec.	1Code
	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2\leqq CVC<\frac{(H-D)}{2}-0.1$	Quotation

SKH51

PIN-POINT GATE BUSHINGS TAPERED GATE HOLE

—B DIMENSION SELECTION TYPE—

SKH51

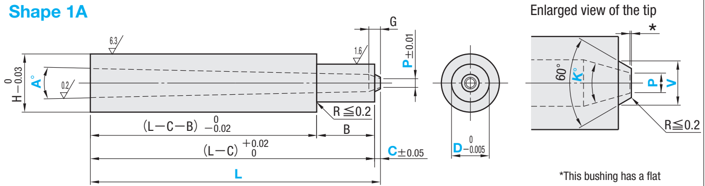

Tapered gate hole
B dimension selection type
B

The inside diameter is finished by electric discharge. The angle (K°) and the secondary sprue (A°) are roundly connected.

Non JIS material definition is listed on P.1351 - 1352

RoHS

Shape 1A

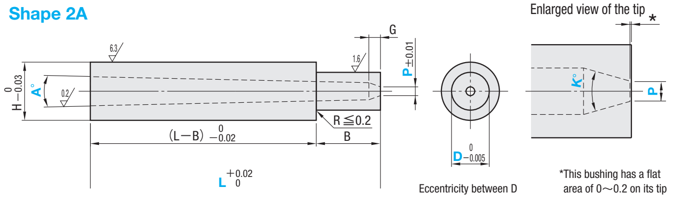

Enlarged view of the tip
G
6.3
1.6
P±0.01
H−0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
C±0.05
D 0 −0.005
L
60°
K°
*
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 2A

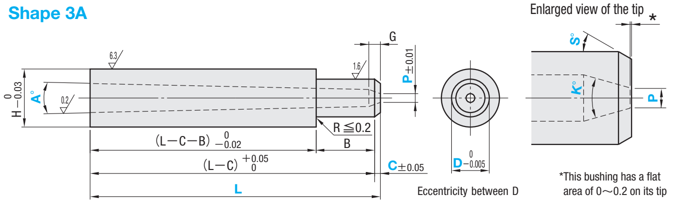

Enlarged view of the tip
G
6.3
1.6
P±0.01
H−0.03 0
A°
0.2
R≦0.2
(L−B) 0 −0.02
B
L +0.02 0
D 0 −0.005
K°
*
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 3A

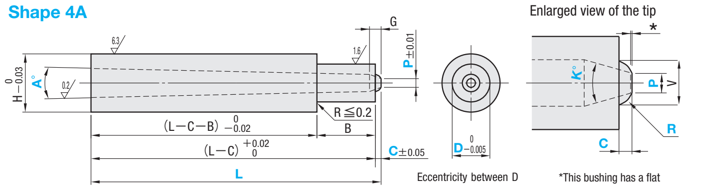

Enlarged view of the tip
G
6.3
1.6
P±0.01
H−0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
C±0.05
D 0 −0.005
L
S°
K°
*
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 4A


Enlarged view of the tip
G
6.3
1.6
P±0.01
H−0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
C±0.05
D 0 −0.005
L
K°
*
P
V
R
C

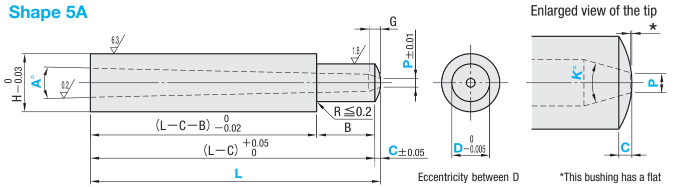
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

$R\geqq\sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

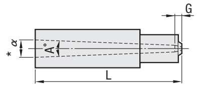
Shape 5A

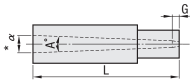

Enlarged view of the tip
G
6.3
1.6
P±0.01
H−0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
C±0.05
D 0 −0.005
L
K°
*
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

- **Calculation for the inlet diameter** $*\alpha$ $*\alpha=2\{(L-G)\tan\frac{A^\circ}{2}+G\tan\frac{K^\circ}{2}\}+P$





The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHBV☐A	SKH51	59~61HRC

H	G	B	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	K°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
4	1.0	4	PGHBV (High Speed Steel SKH51)	1A 2A 3A 4A 5A	2.5	8.00~25.00	0.3 0.4 0.5 0.6(*1)	1	20 30	0.2~0.5	1.5~2.4	1~45	0.6~1.0
5	1.2	6			3	10.00~40.00	0.5 0.6 0.7 0.8(*2)		20 30 40	0.3~0.8	2.0~2.9		0.8~1.5
6					4		0.6 0.7 0.8 0.9 1.0 1.2				2.5~3.9		
8	1.5	10			5	15.00~60.00	0.8 0.9 1.0 1.1 1.2(*3) 1.3(*3) 1.4(*3)	2	20 30 40 50 60	0.5~1.5	3.5~4.9		1.0~2.0
9					6		1.0 1.1 1.2 1.3 1.4 1.5(*4) 1.6(*4)	3			4.0~5.9	1~50	1.5~3.0
11					8		1.2 1.3 1.4 1.5 1.6				4.5~7.9	1~60	2.0~4.0
13	2.0				10						5.0~9.9		2.5~5.0

For shape 4A, $R\geqq\sqrt{(P/2)^2+C^2}$

(*1) For P0.6 (D2.5), only K20° can be selected.

(*2) P0.8 (D3) is selected from K20° • K30°

(*3) For P1.2~P1.4 (D5), only K60° can be selected.

(*4) When P1.5 • P1.6 (D6) and K30° or more, G is 1.2.

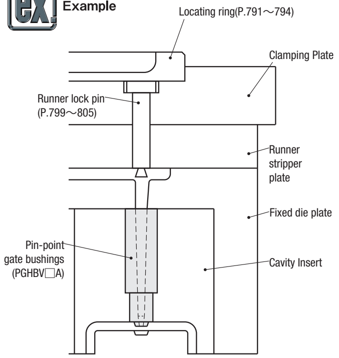
Order

Part Number	L	P	A	K	C V S R
PGHBV1A4	20.01	P0.8	A2	K30	C0.5—V3.0
PGHBV2A4	20.01	P0.8	A2	K30	
PGHBV3A4	20.01	P0.8	A2	K30	C0.5—S30
PGHBV4A4	20.01	P0.8	A2	K30	C0.5—R1.0
PGHBV5A4	20.01	P0.8	A2	K30	C0.5

Days to Ship Quotation

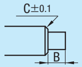
Price Quotation

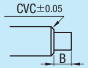
Example


Locating ring(P.791~794)
Clamping Plate
Runner lock pin (P.799~805)
Runner stripper plate
Fixed die plate
Pin-point gate bushings (PGHBV☐A)
Cavity Insert

Alterations

Part Number	L	P	A	K	C V S R	(CC • CVC)
PGHBV1A4	20.01	P0.8	A2	K20	C0.5—V3.0	CVC0.3

Alterations	Code	Spec.	1Code
 	CC	C chamfering for inlay relief. D2.5 → C0.2 D3 • 4 → C0.3 D5~10 → C0.5	Quotation

Alterations	Code	Spec.	1Code
 	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2\leqq CVC<\frac{(H-D)}{2}-0.1$	Quotation

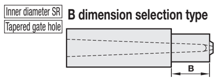
SKH51

PIN-POINT GATE BUSHINGS

INNER DIAMETER SR
TAPERED GATE HOLE

—B DIMENSION SELECTION TYPE—

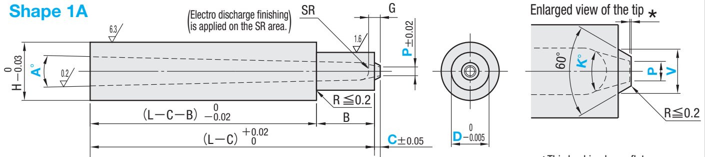
SKH51


Inner diameter SR
Tapered gate hole
B dimension selection type
B

■PGHBZ□A(SR the inside diameter)

RoHS

Shape 1A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P±0.02
H $^{0}_{-0.03}$
A°
0.2
R≦0.2
(L−C−B) $^{0}_{-0.02}$
B
(L−C) $^{+0.02}_{0}$
C±0.05
D $^{0}_{-0.005}$
L
Enlarged view of the tip *
60°
K°
P
V
R≦0.2

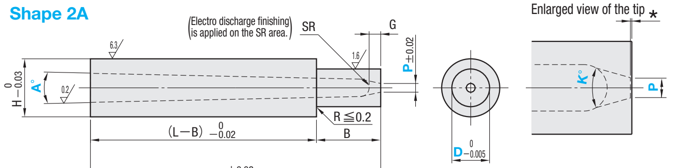
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.05mm on its tip (P dimension).

M SKH51 H 59~61HRC

RoHS

Shape 2A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P±0.02
H $^{0}_{-0.03}$
A°
0.2
R≦0.2
(L−B) $^{0}_{-0.02}$
B
D $^{0}_{-0.005}$
L $^{+0.02}_{0}$
Enlarged view of the tip *
K°
P

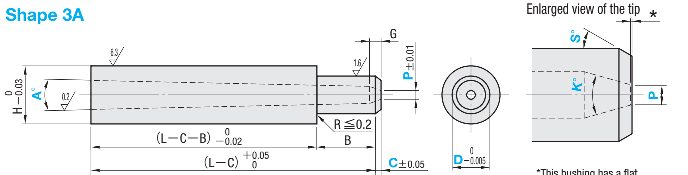
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.05mm on its tip (P dimension).

M SKH51 H 59~61HRC

RoHS

Shape 3A


G
6.3
1.6
P±0.01
H $^{0}_{-0.03}$
A°
0.2
R≦0.2
(L−C−B) $^{0}_{-0.02}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
D $^{0}_{-0.005}$
L
Enlarged view of the tip *
S°
K°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

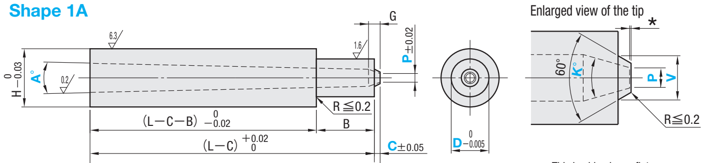
M SKH51 H 59~61HRC

■PGHBVZ□A (Tapered the inside diameter)

The inside diameter is finished by electric discharge. The angle (K°) and the secondary sprue (A°) are roundly connected.

RoHS

Shape 1A


G
6.3
1.6
P±0.02
H $^{0}_{-0.03}$
A°
0.2
R≦0.2
(L−C−B) $^{0}_{-0.02}$
B
(L−C) $^{+0.02}_{0}$
C±0.05
D $^{0}_{-0.005}$
L
Enlarged view of the tip *
60°
K°
P
V
R≦0.2

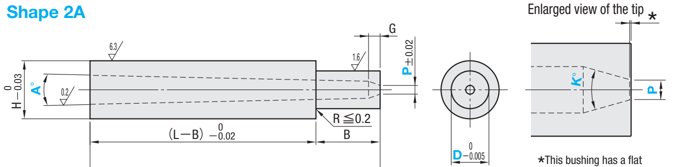
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.05mm on its tip (P dimension).

M SKH51 H 59~61HRC

RoHS

Shape 2A


G
6.3
1.6
P±0.02
H $^{0}_{-0.03}$
A°
0.2
R≦0.2
(L−B) $^{0}_{-0.02}$
B
D $^{0}_{-0.005}$
L $^{+0.02}_{0}$
Enlarged view of the tip *
K°
P

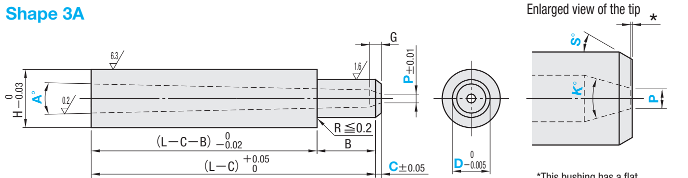
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.05mm on its tip (P dimension).

M SKH51 H 59~61HRC

RoHS

Shape 3A


G
6.3
1.6
P±0.01
H $^{0}_{-0.03}$
A°
0.2
R≦0.2
(L−C−B) $^{0}_{-0.02}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
D $^{0}_{-0.005}$
L
Enlarged view of the tip *
S°
K°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

M SKH51 H 59~61HRC

Non JIS material definition is listed on P.1351 - 1352

H	G	B	SR (PGHBZ only)	Part Number			L 0.01mm increments	P	A°	K°	Shape 1A only C 0.1mm increments	Shape 1A only V 0.1mm increments
				Type	Shape	D						
3	0.7	3	0.60	PGHBZ (SR the inside diameter) PGHBVZ (Tapered the inside diameter)	1A 2A 3A	2(*1)	6.00~20.00	0.3 0.4 0.5(*2)	1 2 3	20 30	0.2~0.4	1.3~1.9
4	1.0	4	0.75			2.5	8.00~25.00	0.3 0.4 0.5 0.6(*2)			0.2~0.5	1.5~2.4
5	1.2	6	1.00			3	10.00~40.00	0.5 0.6 0.7 0.8(*3) 0.9(*4)		20 30 40(*6)	0.3~0.8	2.0~2.9
6			1.00			4		0.6 0.7				2.5~3.9
			1.25					0.8 0.9 1.0 1.1 1.2				
8	1.5	8	1.25			5	15.00~60.00	0.8 0.9 1.0		20 30 40(*6) 50(*6) 60(*6)	0.5~1.5	3.5~4.9
			1.50					1.2 1.3 1.4 1.5(*5)				
9			1.25			6		1.0				4.0~5.9
			1.50					1.2 1.3 1.4 1.5(*5)1.6(*5)				

(*1) D2 can be designated only for PGHBZ
(*2) P0.5(D2) • For P0.6(D2.5), only K20° can be selected
(*3) P0.8(D3) of PGHBVZ is selected from K20° • K30°
(*4) When P0.9(D3) and K30°, G is 1.0. (Designation is possible for PGHBZ only)
(*5) In case of P1.5 • P1.6(D6) and K30° or more, G is 1.2.
(*6) K40 • K50 • K60 can be designated only for PGHBVZ
However, When P1.2~1.4(D5), not available for K60

Order

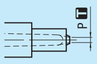
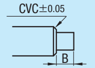
Part Number	L	P	A	K	C	V
PGHBZ1A4	20.01	P0.8	A2	K30	C0.5	V3.0
PGHBZ2A4	20.01	P0.8	A2	K30		
PGHBVZ1A4	20.01	P0.8	A2	K30	C0.5	V3.5
PGHBVZ2A4	20.01	P0.8	A2	K30		

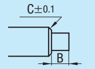
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	A	K	C	V	(PKC · CC · CVC)
PGHBZ1A4	20.01	P0.8	A2	K20	C0.5	V3.0	CVC0.3

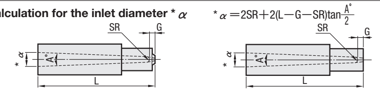
Alterations	Code	Spec.	1Code
 P	PKC	Changes P dimension tolerance. P±0.02 ···› P±0.01	Quotation
 CVC±0.05 B	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(H-D)}{2} - 0.1$	

Alterations	Code	Spec.	1Code
 C±0.1 B	CC	C chamfering for inlay relief. D2 • 2.5 → C0.2 D3 • 4 → C0.3 D5 • 6 → C0.5	Quotation

■PGHBZ□A(SR the inside diameter)

● **Calculation for the inlet diameter** *α

$$*\alpha = 2SR + 2(L-G-SR)\tan\frac{A^\circ}{2}$$

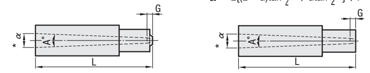

SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

■PGHBVZ□A (Tapered the inside diameter)

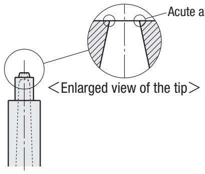
● **Calculation for the inlet diameter** *α

$$*\alpha = 2\{(L-G)\tan\frac{A^\circ}{2} + G\tan\frac{K^\circ}{2}\} + P$$

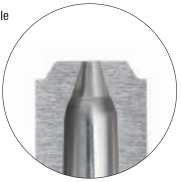


The dimension acquired using the above calculation is the theoretical (reference) value.

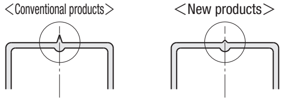
■Characteristics


Acute angle
<Enlarged view of the tip>

<Enlarged photograph of tip>



- Compared with conventional products that have a straight part of 0~0.2mm on the tip, this product has restricted the straight part on its tip to 0~0.05mm.
- Since the straight part on the tip is finished from an acute angle, the gate residual can be suppressed.

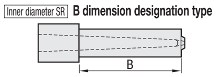


SKH51

PIN-POINT GATE BUSHINGS Inner diameter SR

—B DIMENSION DESIGNATION TYPE— NORMAL TYPE • TIP CORNER ACUTE ANGLE TYPE

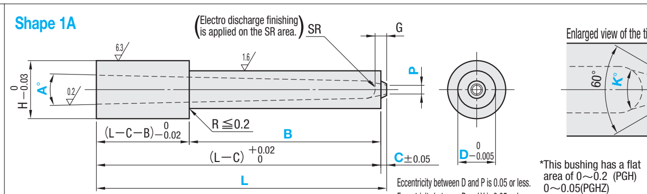
SKH51



Inner diameter SR
B dimension designation type
B

RoHS

Shape 1A



(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
R≦0.2
(L—C—B) 0 −0.02
B
(L—C) +0.02 0
L
C±0.05
P
D 0 −0.005
Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

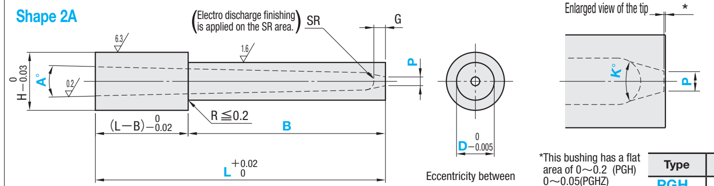
*This bushing has a flat area of 0~0.2 (PGH) 0~0.05(PGHZ) on its tip (P dimension).

Type	P
PGH	±0.01
PGHZ	±0.02

(L—C—B)≧3.0

RoHS

Shape 2A



(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
R≦0.2
(L—B) 0 −0.02
B
L +0.02 0
P
D 0 −0.005
Enlarged view of the tip
*
K°
P

Eccentricity between D and P is 0.05 or less.

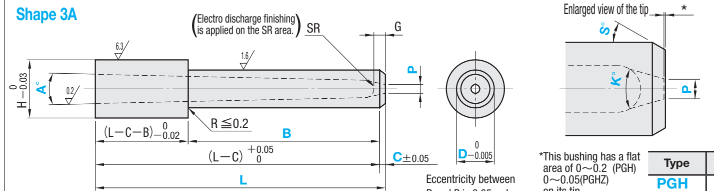
*This bushing has a flat area of 0~0.2 (PGH) 0~0.05(PGHZ) on its tip (P dimension).

Type	P
PGH	±0.01
PGHZ	±0.02

(L—B)≧3.0

RoHS

Shape 3A



(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
R≦0.2
(L—C—B) 0 −0.02
B
(L—C) +0.05 0
L
C±0.05
P
D 0 −0.005
Enlarged view of the tip
*
S°
K°
P

Eccentricity between D and P is 0.05 or less.

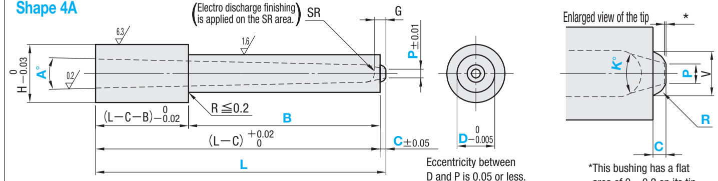
*This bushing has a flat area of 0~0.2 (PGH) 0~0.05(PGHZ) on its tip (P dimension).

Type	P
PGH	±0.01
PGHZ	±0.02

(L—C—B)≧3.0

RoHS

Shape 4A



(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
R≦0.2
(L—C—B) 0 −0.02
B
(L—C) +0.02 0
L
C±0.05
P±0.01
D 0 −0.005
Enlarged view of the tip
*
K°
P
V
R
C

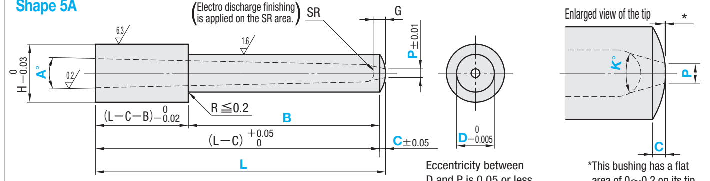
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L—C—B)≧3.0 $R \geqq \sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

Shape 5A



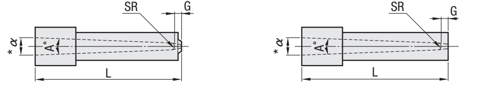
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
R≦0.2
(L—C—B) 0 −0.02
B
(L—C) +0.05 0
L
C±0.05
P±0.01
D 0 −0.005
Enlarged view of the tip
*
K°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L—C—B)≧3.0

● Calculation for the inlet diameter *α *$\alpha=2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$



SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGH□A PGHZ□A	SKH51	59~61HRC

Non JIS material definition is listed on P.1351 - 1352

H	G	SR	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	K°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
3	0.7	0.60	PGH (Normal type) PGHZ (Acute angle type)	1A 2A 3A (4A)(*4) (5A)(*4)	2	6.00~20.00	0.3 0.4 0.5(*1)	1 2 3	20	3.00~ 5.00	0.2~0.4	1.3~1.9	1~45	0.4~0.8
4	1.0	0.75			2.5	8.00~25.00	0.3 0.4 0.5 0.6(*1)	1 2 3		4.00~ 6.00	0.2~0.5	1.5~2.4		0.6~1.0
5	1.2	1.00			3	10.00~40.00	0.5 0.6 0.7 0.8 0.9(*2)	1 2 3		5.00~ 9.00 5.00~ 8.00 5.00~ 7.00	0.3~0.8	2.0~2.9		0.8~1.5
6		1.00			4		0.6 0.7	1 2 3		5.00~30.00 5.00~20.00		2.5~3.9		
		1.25					0.8 0.9 1.0 1.1 1.2	1 2 3		5.00~30.00 5.00~20.00				
8	1.5	1.25			5	15.00~60.00	0.8 0.9 1.0	1 2 3	30	5.00~35.00 5.00~30.00	0.5~1.5	3.5~4.9		1.0~2.0
		1.50					1.2 1.3 1.4 1.5(*3)	1 2 3		5.00~30.00 5.00~20.00				
9		1.25			6		1.0	1 2 3		5.00~50.00 5.00~40.00		4.0~5.9	1~50	1.5~3.0
		1.50					1.2 1.3 1.4 1.5(*3) 1.6(*3)	1 2 3		5.00~40.00 5.00~30.00				
11		1.50			8		1.2 1.3 1.4	1 2 3		5.00~50.00		4.5~7.9	1~60	2.0~4.0
		2.00					1.5 1.6	1 2 3						

For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

(*1) P0.5 (D2) • For P0.6 (D2.5), only K20° can be selected.

(*2) When P0.9 (D3) and K30° , G is 1.0.

(*3) When P1.5 • P1.6 (D5 • D6) and K30° , G is 1.2.

(*4) Shape ( ) is only for PGH.

Order

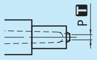
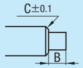
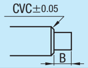
Part Number	L	P	A	K	B	C V S R
PGH1A4	20.01	P0.8	A2	K30	B15.00	C0.5—V3.0
PGHZ2A4	20.01	P0.8	A2	K30	B15.00	
PGHZ3A4	20.01	P0.8	A2	K30	B15.00	C0.5—S30
PGH4A4	20.01	P0.8	A2	K30	B15.00	C0.5—R1.0
PGH5A4	20.01	P0.8	A2	K30	B15.00	C0.5

Price Quotation

Days to Ship Quotation

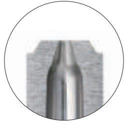
Alterations

Part Number	L	P	A	K	B	C V S R	(CC • CVC)
PGH1A4	20.01	P0.8	A2	K20	B15.00	C0.5—V3.0	CVC0.3

Alterations	Code	Spec.	1Code
 P	PKC	Changes P dimension tolerance. P±0.02 ···▸ ±0.01 Only applicable for PGHZ.	Quotation
 C±0.1 B	CC	C chamfering for inlay relief. D2 • 2.5 → C0.2 D3 • 4 → C0.3 D5~8 → C0.5	
 CVC±0.05 B	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2\leqq CVC<\frac{(H-D)}{2}-0.1$	

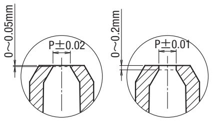
■Characteristics

<Enlarged photograph of tip>



Acute angle type

<Enlarged view of the tip>



0~0.05mm
P±0.02
0~0.2mm
P±0.01

Acute angle type Normal type

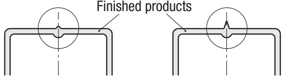
Normal type

- It has a flat area of 0~0.2mm on its tip.
- P dimension tolerance is ±0.01.

Acute angle type

- It has a flat area of 0~0.05mm on its tip.
- P dimension tolerance is ±0.02.
- With the straight part shorter than the normal type, the gate residual can be suppressed but durability may be decreased.

<Acute angle type> <Normal type>



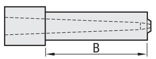
Finished products

SKH51

PIN-POINT GATE BUSHINGS Tapered gate hole

—B DIMENSION DESIGNATION TYPE— NORMAL TYPE・TIP CORNER ACUTE ANGLE TYPE

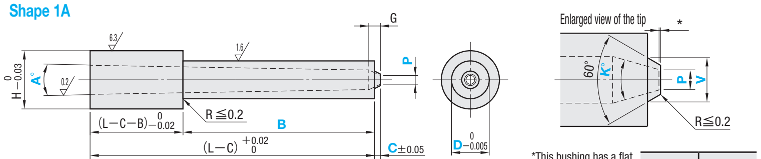
SKH51 Tapered gate hole B dimension designation type



Non JIS material definition is listed on P.1351 - 1352

The inside diameter is finished by electric discharge. The angle (K°) and the secondary sprue (A°) are roundly connected.

RoHS **Shape 1A**


6.3
1.6
0.2
G
P
H -0.03 0
A°
R≦0.2
(L−C−B) -0.02 0
B
(L−C) +0.02 0
C±0.05
D -0.005 0
L
Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

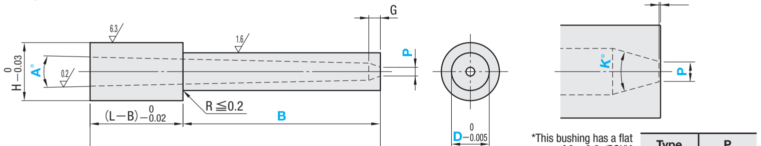
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.2 (PGHV) 0~0.05(PGHVZ) on its tip (P dimension).

Type	P
PGHV	±0.01
PGHVZ	±0.02

(L−C−B)≧3.0

RoHS **Shape 2A**


6.3
1.6
0.2
G
P
H -0.03 0
A°
R≦0.2
(L−B) -0.02 0
B
L +0.02 0
D -0.005 0
Enlarged view of the tip
*
K°
P

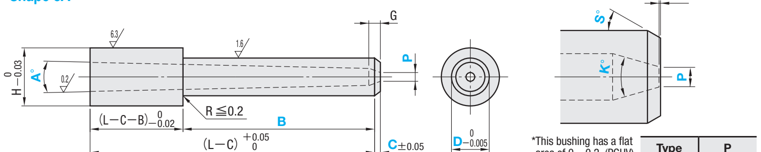
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 (PGHV) 0~0.05(PGHVZ) on its tip (P dimension).

Type	P
PGHV	±0.01
PGHVZ	±0.02

(L−B)≧3.0

RoHS **Shape 3A**


6.3
1.6
0.2
G
P
H -0.03 0
A°
R≦0.2
(L−C−B) -0.02 0
B
(L−C) +0.05 0
C±0.05
D -0.005 0
L
Enlarged view of the tip
*
S°
K°
P

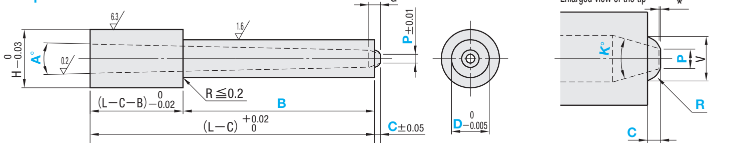
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 (PGHV) 0~0.05(PGHVZ) on its tip (P dimension).

Type	P
PGHV	±0.01
PGHVZ	±0.02

(L−C−B)≧3.0

RoHS **Shape 4A**

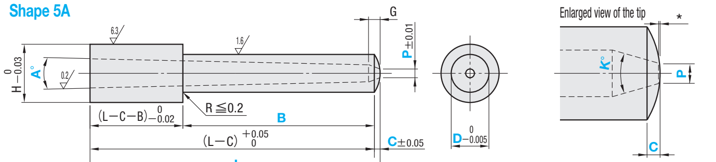

6.3
1.6
0.2
G
P±0.01
H -0.03 0
A°
R≦0.2
(L−C−B) -0.02 0
B
(L−C) +0.02 0
C±0.05
D -0.005 0
L
Enlarged view of the tip
*
K°
P
V
R
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0 $R \geqq \sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS **Shape 5A**

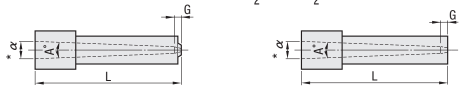

6.3
1.6
0.2
G
P±0.01
H -0.03 0
A°
R≦0.2
(L−C−B) -0.02 0
B
(L−C) +0.05 0
C±0.05
D -0.005 0
L
Enlarged view of the tip
*
K°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0

- Calculation for the inlet diameter *α $*\alpha=2\{(L-G)\tan\frac{A^\circ}{2}+G\tan\frac{K^\circ}{2}\}+P$



The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHV□A PGHVZ□A	SKH51	59~61HRC

H	G	Part Number Type	Part Number Shape	D	L 0.01mm increments	P	A°	K°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
4	1.0	PGHV (Normal type) PGHVZ (Acute angle type)	1A 2A 3A (4A)(*5) (5A)(*5)	2.5	8.00~25.00	0.3 0.4 0.5 0.6(*1)	1 2 3	20 30	4.00~ 6.00	0.2~0.5	1.5~2.4	1~45	0.6~1.0
5	1.2			3	10.00~40.00	0.5 0.6 0.7 0.8(*2)	1 2 3	20 30 40	5.00~ 9.00 5.00~ 8.00 5.00~ 7.00	0.3~0.8	2.0~2.9		0.8~1.5
6				4		0.6 0.7 0.8 0.9 1.0	1 2 3		5.00~30.00 5.00~20.00		2.5~3.9		
8	1.5			5	15.00~60.00	0.8 0.9 1.0	1 2 3	20 30 40 50 60	5.00~35.00 5.00~30.00 5.00~20.00	0.5~1.5	3.5~4.9		1.0~2.0
						1.1 1.2(*3) 1.3(*3) 1.4(*3)	1 2 3		5.00~30.00 5.00~20.00				
9				6		1.0	1 2 3		5.00~50.00 5.00~35.00		4.0~5.9	1~50	1.5~3.0
						1.1 1.2 1.3 1.4 1.5(*4) 1.6(*4)	1 2 3		5.00~40.00 5.00~30.00				
11				8		1.2 1.3 1.4 1.5 1.6	1 2 3		5.00~50.00		4.5~7.9	1~60	2.0~4.0
13	2.0			10		1.2 1.3 1.4 1.5 1.6	1 2 3				5.0~9.9		2.5~5.0

For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

(*1) Only K20° can be selected for P0.6 (D2.5)
(*2) P0.8(D3) can be selected from K20° ・K30°
(*3) Only K60° cannot selected for P1.2~P1.4 (D5)
(*4) When P1.5・P1.6 (D6) and K30° or more, G is 1.2.
(*5) Shape ( ) is only for PGHV.

Order

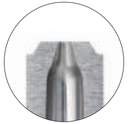
Part Number	L	P	A	K	B	C V S R
PGHV1A4	20.01	P0.8	A2	K30	B15.00	C0.5—V3.0
PGHVZ2A4	20.01	P0.8	A2	K30	B15.00	
PGHVZ3A4	20.01	P0.8	A2	K30	B15.00	C0.5—S30
PGHV4A4	20.01	P0.8	A2	K30	B15.00	C0.5—R1.0
PGHV5A4	20.01	P0.8	A2	K30	B15.00	C0.5

Price Quotation

Days to Ship Quotation

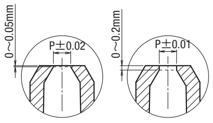
■Characteristics

<Enlarged photograph of tip>



Acute angle type

<Enlarged view of the tip>

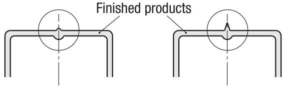

0~0.05mm
P±0.02
0~0.2mm
P±0.01

Acute angle type   Normal type

Normal type
- It has a flat area of 0~0.2mm on its tip.
- P dimension tolerance is ±0.01.

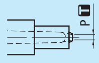
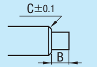
Acute angle type
- It has a flat area of 0~0.05mm on its tip.
- P dimension tolerance is ±0.02.
- With the straight part shorter than the normal type, the gate residual can be suppressed but durability may be decreased.

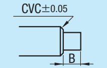
<Acute angle type>   <Normal type>


Finished products

Alterations

Part Number	L	P	A	K	B	C V S R	(CC・CVC)
PGHV1A4	20.01	P0.8	A2	K20	B15.00	C0.5—V3.0	CVC0.3

Alterations	Code	Spec.	1Code
	PKC	Changes P dimension tolerance. P±0.02 ···› ±0.01 Only applicable for PGHVZ.	Quotation
	CC	C chamfering for inlay relief. D2.5 → C0.2 D3・4 → C0.3 D5~10 → C0.5	

Alterations	Code	Spec.	1Code
	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2\leqq CVC<\frac{(H-D)}{2}-0.1$	Quotation

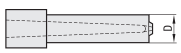
SKH51

PIN-POINT GATE BUSHINGS Inner diameter SR

—D DIMENSION DESIGNATION TYPE— NORMAL TYPE・TIP CORNER ACUTE ANGLE TYPE

SKH51

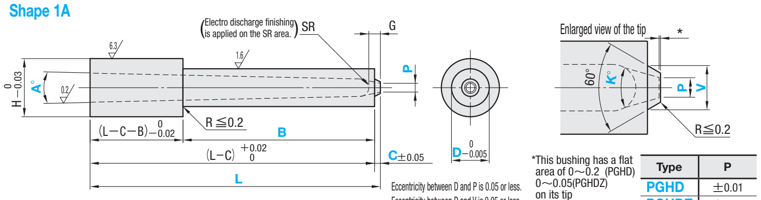
Inner diameter SR **D dimension designation type**



Non JIS material definition is listed on P.1351 - 1352

RoHS

Shape 1A


(Electro discharge finishing is applied on the SR area.) SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P
(L−C−B) 0 −0.02
R≦0.2
B
(L−C) +0.02 0
C±0.05
D 0 −0.005
L
Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

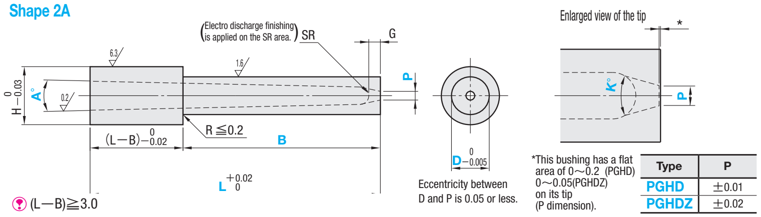
*This bushing has a flat area of 0~0.2 (PGHD) 0~0.05(PGHDZ) on its tip (P dimension).

Type	P
PGHD	±0.01
PGHDZ	±0.02

(L−C−B)≧3.0

RoHS

Shape 2A


(Electro discharge finishing is applied on the SR area.) SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P
(L−B) 0 −0.02
R≦0.2
B
L +0.02 0
D 0 −0.005
Enlarged view of the tip
*
K°
P

Eccentricity between D and P is 0.05 or less.

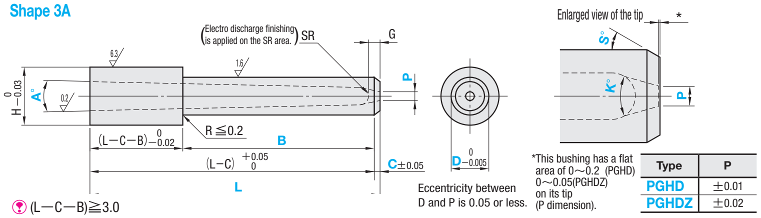
*This bushing has a flat area of 0~0.2 (PGHD) 0~0.05(PGHDZ) on its tip (P dimension).

Type	P
PGHD	±0.01
PGHDZ	±0.02

(L−B)≧3.0

RoHS

Shape 3A


(Electro discharge finishing is applied on the SR area.) SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P
(L−C−B) 0 −0.02
R≦0.2
B
(L−C) +0.05 0
C±0.05
D 0 −0.005
L
Enlarged view of the tip
*
S°
K°
P

Eccentricity between D and P is 0.05 or less.

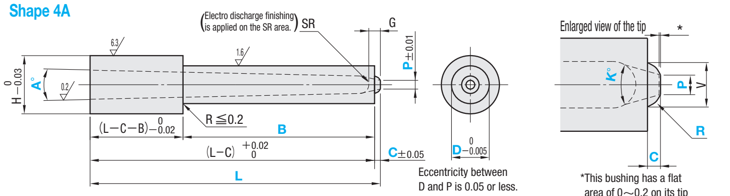
*This bushing has a flat area of 0~0.2 (PGHD) 0~0.05(PGHDZ) on its tip (P dimension).

Type	P
PGHD	±0.01
PGHDZ	±0.02

(L−C−B)≧3.0

RoHS

Shape 4A


(Electro discharge finishing is applied on the SR area.) SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
(L−C−B) 0 −0.02
R≦0.2
B
(L−C) +0.02 0
C±0.05
D 0 −0.005
L
Enlarged view of the tip
*
K°
P
V
R
C

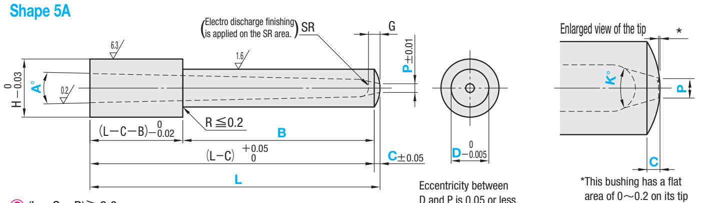
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0 For shape 4A, $R \geqq \sqrt{(P/2)^2 + C^2}$ $V = 2 \times \sqrt{R^2 - (\sqrt{R^2 - (P/2)^2} - C)^2}$

RoHS

Shape 5A

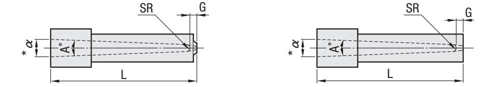

(Electro discharge finishing is applied on the SR area.) SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
(L−C−B) 0 −0.02
R≦0.2
B
(L−C) +0.05 0
C±0.05
D 0 −0.005
L
Enlarged view of the tip
*
K°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0

- Calculation for the inlet diameter $*\alpha$ $*\alpha = 2SR + 2(L - G - SR)\tan\frac{A^\circ}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHD□A PGHDZ□A	SKH51	59~61HRC

H	G	SR	Part Number Type	Part Number Shape	Part Number No.	L 0.01mm increments	D 0.01mm increments	P	A°	K°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
4	1.0	0.75	**PGHD** (Normal type) **PGHDZ** (Acute angle type)	1A 2A 3A (4A)(*4) (5A)(*4)	2.5	8.00~25.00	2.51~ 3.00	0.3 0.4 0.5 0.6(*1)	1	20	4.00~ 6.00	0.2~0.5	1.5~2.4	1~45	0.6~1.0
									2						
									3						
5	1.2	1.00			3	10.00~40.00	3.01~ 4.00	0.5 0.6 0.7 0.8 0.9(*2)	1		5.00~ 9.00	0.3~0.8	2.0~2.9		0.8~1.5
									2		5.00~ 8.00				
									3		5.00~ 7.00				
6		1.00			4		4.01~ 5.00	0.6 0.7	1		5.00~30.00		2.5~3.9		
									2						
									3		5.00~20.00				
		1.25						0.8 0.9 1.0 1.1 1.2	1		5.00~30.00				
									2						
									3		5.00~20.00				
8	1.5	1.25			5	15.00~60.00	5.01~ 7.00	0.8 0.9 1.0	1		5.00~35.00	0.5~1.5	3.5~4.9		1.0~2.0
									2		5.00~30.00				
									3						
		1.50						1.2 1.3 1.4 1.5(*3)	1		5.00~30.00				
									2						
									3		5.00~20.00				
9		1.25			6		6.01~ 8.00	1.0	1	30	5.00~50.00		4.0~4.9	1~50	1.5~3.0
									2						
									3		5.00~40.00				
		1.50						1.2 1.3 1.4 1.5(*3) 1.6(*3)	1		5.00~40.00				
									2						
									3		5.00~30.00				
11		1.50			8		8.01~10.00	1.2 1.3 1.4	1		5.00~50.00		4.5~7.9	1~60	2.0~4.0
									2						
									3						
		2.00						1.5 1.6	1						
									2						
									3						

For shape 4A, $R \geqq \sqrt{(P/2)^2 + C^2}$

(*1) Only K20° can be selected for P0.6 (No.2.5)

(*2) When P0.9 (No.3) and K30°, G is 1.0.

(*3) When P1.5・P1.6 (No.5・No.6) and K30°, G is 1.2.

(*4) Shape ( ) is only for PGHD.

Order

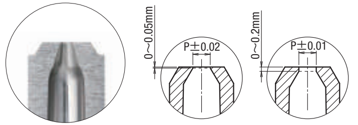
Part Number	L	D	P	A	K	B	C V S R
PGHD1A3	20.01	D3.50	P0.8	A2	K30	B5.00	C0.5−V2.9
PGHDZ2A3	20.01	D3.50	P0.8	A2	K30	B5.00	
PGHDZ3A3	20.01	D3.50	P0.8	A2	K30	B5.00	C0.5−S30
PGHD4A3	20.01	D3.50	P0.8	A2	K30	B5.00	C0.5−R1.0
PGHD5A3	20.01	D3.50	P0.8	A2	K30	B5.00	C0.5

Price Quotation

Days to Ship Quotation

Characteristics

<Enlarged photograph of tip> <Enlarged view of the tip>


0~0.05mm
P±0.02
0~0.2mm
P±0.01

Acute angle type Acute angle type Normal type

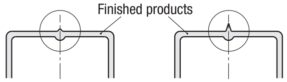
Normal type

- It has a flat area of 0~0.2mm on its tip.
- P dimension tolerance is ±0.01.

Acute angle type

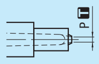
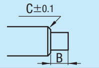
- It has a flat area of 0~0.05mm on its tip.
- P dimension tolerance is ±0.02.
- With the straight part shorter than the normal type, the gate residual can be suppressed but durability may be decreased.

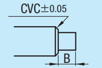
<Acute angle type> <Normal type>


Finished products

Alterations

Part Number − L − D − P − A − K − B − CVSR − (CC・CVC)
PGHD1A3 − 20.01 − D3.50 − P0.8 − A2 − K30 − B5.00 − C0.5−V2.9 − CC

Alterations	Code	Spec.	1Code
	PKC	Changes P dimension tolerance. P±0.02 ···▸ ±0.01 Only applicable for PGHDZ.	Quotation
	CC	C chamfering for inlay relief. No.2.5 → C0.2 No.3・4 → C0.3 No.5~8 → C0.5	

Alterations	Code	Spec.	1Code
	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(H-D)}{2} - 0.1$	Quotation

SKH51

PIN-POINT GATE BUSHINGS Inner diameter SR

—LARGE K° TYPE— NORMAL TYPE・TIP CORNER ACUTE ANGLE TYPE

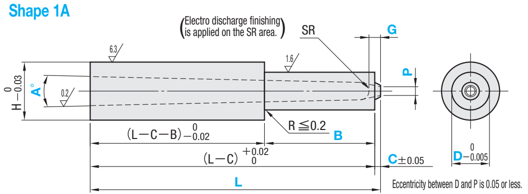
SKH51

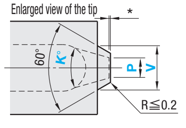
Inner diameter SR **Large K° Type**

Non JIS material definition is listed on P.1351 - 1352

RoHS

Shape 1A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P
0.2
A°
H −0.03 0
R≦0.2
B
(L−C−B) −0.02 0
(L−C) +0.02 0
C±0.05
L
D −0.005 0


Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

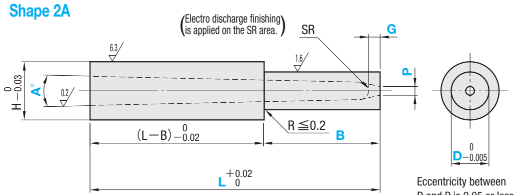
*This bushing has a flat area of 0~0.2 (PGHF) 0~0.05(PGHFZ) on its tip (P dimension).

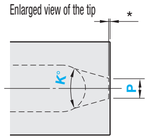
Type	P
PGHF	±0.01
PGHFZ	±0.02

$(L-C-B)\geqq 3.0$

RoHS

Shape 2A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P
0.2
A°
H −0.03 0
R≦0.2
B
(L−B) −0.02 0
L +0.02 0
D −0.005 0


Enlarged view of the tip
*
K°
P

Eccentricity between D and P is 0.05 or less.

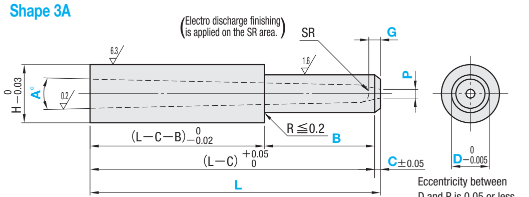
*This bushing has a flat area of 0~0.2 (PGHF) 0~0.05(PGHFZ) on its tip (P dimension).

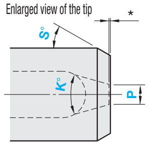
Type	P
PGHF	±0.01
PGHFZ	±0.02

$(L-B)\geqq 3.0$

RoHS

Shape 3A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P
0.2
A°
H −0.03 0
R≦0.2
B
(L−C−B) −0.02 0
(L−C) +0.05 0
C±0.05
L
D −0.005 0


Enlarged view of the tip
*
S°
K°
P

Eccentricity between D and P is 0.05 or less.

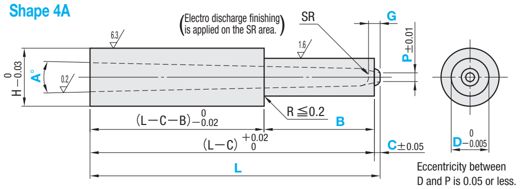
*This bushing has a flat area of 0~0.2 (PGHF) 0~0.05(PGHFZ) on its tip (P dimension).

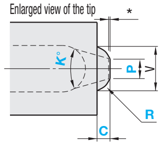
Type	P
PGHF	±0.01
PGHFZ	±0.02

$(L-C-B)\geqq 3.0$

RoHS

Shape 4A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P±0.01
0.2
A°
H −0.03 0
R≦0.2
B
(L−C−B) −0.02 0
(L−C) +0.02 0
C±0.05
L
D −0.005 0


Enlarged view of the tip
*
K°
P
V
R
C

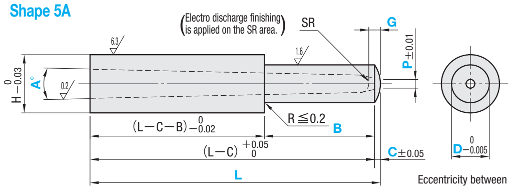
Eccentricity between D and P is 0.05 or less.

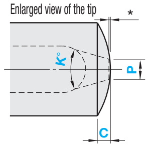
*This bushing has a flat area of 0~0.2 on its tip (P dimension).

$(L-C-B)\geqq 3.0$　$R\geqq\sqrt{(P/2)^2+C^2}$　$V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

Shape 5A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
P±0.01
0.2
A°
H −0.03 0
R≦0.2
B
(L−C−B) −0.02 0
(L−C) +0.05 0
C±0.05
L
D −0.005 0

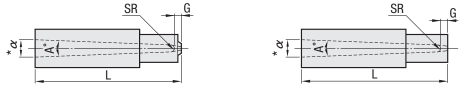

Enlarged view of the tip
*
K°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

$(L-C-B)\geqq 3.0$

● Calculation for the inlet diameter $*\alpha$　$*\alpha=2SR+2(L-G-SR)\tan\frac{A°}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHF□A PGHFZ□A	SKH51	59~61HRC

H	SR	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	G	A°	K°	B 0.01mm increments	C (None for 2A) 0.1mm increments	V (Shape 1A only) 0.1mm increments	S (Shape 3A only) 1° increments	R (Shape 4A only) 0.1mm increments
9	1.25	PGHF (Normal type) PGHFZ (Acute angle type)	1A 2A 3A (4A)* (5A)*	6	15.00~40.00	0.5	0.8	1 2 3	20 30 40 50	5.00~20.00	0.5~1.5	4.0~5.9	1~50	1.5~3.0
	1.25						1.0							
	1.50						1.2							
	1.25					0.6	0.8							
	1.50						1.0							
	1.50						1.2							
11	1.75			8		0.8	0.8		20 30 40 50 60			4.5~7.9	1~60	2.0~4.0
	2.00						1.0							
	2.00						1.2							
	2.25						1.5							
	1.75					1.0	0.8							
	2.00						1.0							
	2.25						1.2							
	2.50						1.5							
	2.00					1.2	0.8							
	2.25						1.0							
	2.50						1.2							
	2.25					1.4	0.8							
	2.50						1.0							
13	2.00			10		1.2	0.8					5.0~9.9		2.5~5.0
	2.25						1.0							
	2.50						1.2							
	2.75						1.5							
	2.25					1.4	0.8							
	2.50						1.0							
	2.75						1.2							
	3.00						1.5							
	2.50					1.6	0.8							
	2.75						1.0							
	3.00						1.2							
	3.25						1.5							

For 4A shape, $R\geqq\sqrt{(P/2)^2+C^2}$　(*) Shape ( ) is only for PGHF.

Order

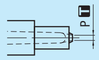
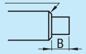
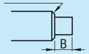
Part Number	L	P	G	A	K	B	C V S R
PGHF1A8	20.01	P0.8	G1.0	A2	K50	B15.00	C0.5—V6.0
PGHFZ2A8	20.01	P0.8	G1.0	A2	K50	B15.00	
PGHFZ3A8	20.01	P0.8	G1.0	A2	K50	B15.00	C0.5—S30
PGHF4A8	20.01	P0.8	G1.0	A2	K50	B15.00	C0.5—R3.0
PGHF5A8	20.01	P0.8	G1.0	A2	K50	B15.00	C0.5

Days to Ship Quotation

Price Quotation

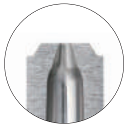
Alterations

Part Number — L — P — G — A — K — B — C V S R — (CC・CVC)
PGHF1A8 — 20.01 — P0.8 — G1.0 — A2 — K50 — B15.00 — C0.5—V6.0 — CC

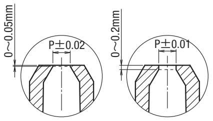
Alterations	Code	Spec.	1Code
	PKC	Changes P dimension tolerance. P±0.02 ••• ±0.01 Only applicable for PGHFZ.	Quotation
C0.5±0.1 	CC	C chamfering for inlay relief.	
CVC±0.05 	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2\leqq CVC<\frac{(H-D)}{2}-0.1$	

■Characteristics

<Enlarged photograph of tip>　<Enlarged view of the tip>



Acute angle type


0~0.05mm
P±0.02
0~0.2mm
P±0.01

Acute angle type　Normal type

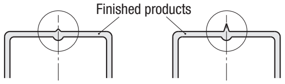
Normal type

- It has a flat area of 0~0.2mm on its tip.
- P dimension tolerance is ±0.01.

Acute angle type

- It has a flat area of 0~0.05mm on its tip.
- P dimension tolerance is ±0.02.
- With the straight part shorter than the normal type, the gate residual can be suppressed but durability may be decreased.

<Acute angle type>　<Normal type>


Finished products

SKH51

PIN-POINT GATE BUSHINGS WITH HEAD INNER DIAMETER SR

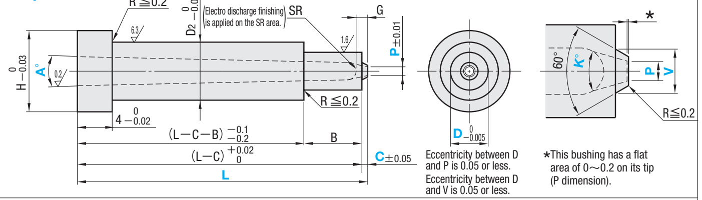
—B DIMENSION SELECTION TYPE—

SKH51 | Inner diameter SR **Head type**

Non JIS material definition is listed on P.1351 - 1352

RoHS

Shape 1A


R≦0.2
D2 0 −0.05
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
P±0.01
H 0 −0.03
A°
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.02 0
L
C±0.05
D 0 −0.005
60°
K°
P
V
R≦0.2
*

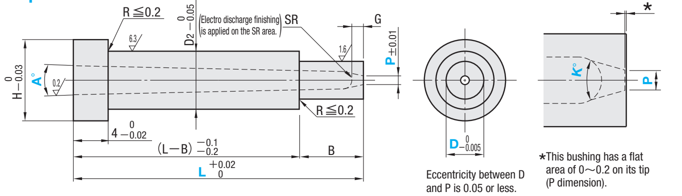
Enlarged view of the tip

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 2A


R≦0.2
D2 0 −0.05
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
P±0.01
H 0 −0.03
A°
R≦0.2
4 0 −0.02
(L−B) −0.1 −0.2
B
L +0.02 0
D 0 −0.005
K°
P
*

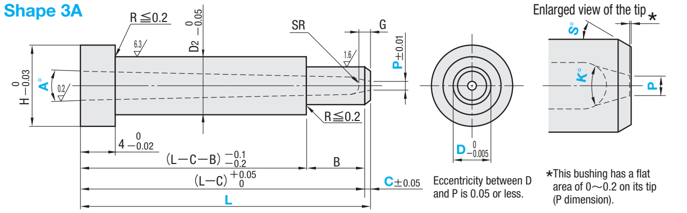
Enlarged view of the tip

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 3A


R≦0.2
D2 0 −0.05
SR
G
6.3
1.6
0.2
P±0.01
H 0 −0.03
A°
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
L
C±0.05
D 0 −0.005
S°
K°
P
*

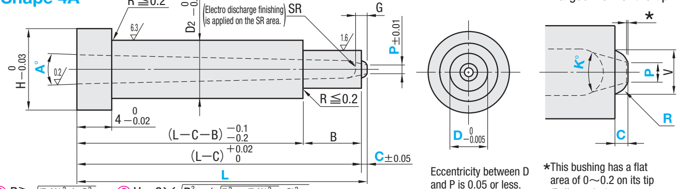
Enlarged view of the tip

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 4A


R≦0.2
D2 0 −0.05
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
P±0.01
H 0 −0.03
A°
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.02 0
L
C±0.05
D 0 −0.005
K°
P
V
R
C
*

Enlarged view of the tip

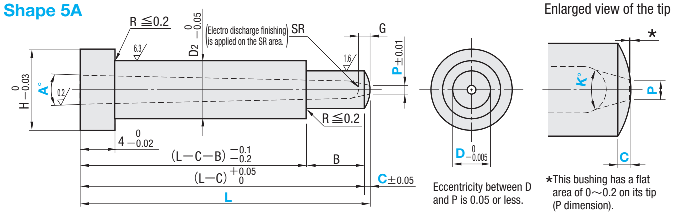
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

$R \geqq \sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

Shape 5A

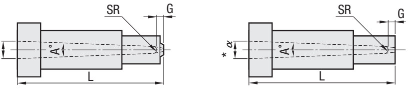

R≦0.2
D2 0 −0.05
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
P±0.01
H 0 −0.03
A°
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
L
C±0.05
D 0 −0.005
K°
P
C
*

Enlarged view of the tip

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

- **Calculation for the inlet diameter** $*\alpha$ $*\alpha=2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHT□A	SKH51	59~61HRC

H	D2	G	B	SR	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	K°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
6	3	0.7	3	0.60	PGHT (High Speed Steel SKH51)	1A 2A 3A 4A 5A	2	10.00~20.00	0.3 0.4 0.5(*1)	1 2 3	20 30	0.2~0.4	1.3~1.9	1~45	0.4~0.8
7	4	1.0	4	0.75			2.5	10.00~25.00	0.3 0.4 0.5 0.6(*1)			0.2~0.5	1.5~2.4		0.6~1.0
8	5	1.2	6	1.00			3	20.00~40.00	0.5 0.6 0.7 0.8 0.9(*2)			0.3~0.8	2.0~2.9		0.8~1.5
9	6			1.00			4		0.6 0.7				2.5~3.9		
				1.25					0.8 0.9 1.0 1.1 1.2						
11	8	1.5	10	1.25			5	20.00~60.00	0.8 0.9 1.0			0.5~1.5	3.5~4.9		1.0~2.0
				1.50					1.2 1.3 1.4 1.5(*3)						
12	9			1.25			6		1.0				4.0~5.9	1~50	1.5~3.0
				1.50					1.2 1.3 1.4 1.5(*3) 1.6(*3)						
14	11			1.50			8		1.2 1.3 1.4				4.5~7.9	1~60	2.0~4.0
				2.00					1.5 1.6						

(*1) When P0.5(D2) • P0.6(D2.5), only K20° can be selected.

For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

(*2) When P0.9(D3) and K30°, G is 1.0.

(*3) When P1.5 • P1.6(D5 • D6) and K30°, G is 1.2.

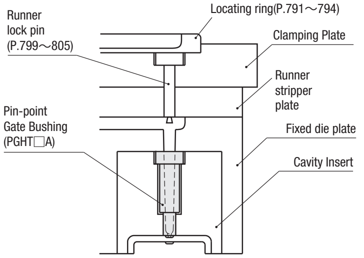
Order

Part Number		L		P		A		K		C V S R
PGHT1A4	—	35.01	—	P0.8	—	A2	—	K30	—	C0.5 — V3.0
PGHT2A4	—	35.01	—	P0.8	—	A2	—	K30		
PGHT3A4	—	35.01	—	P0.8	—	A2	—	K30	—	C0.5 — S30
PGHT4A4	—	35.01	—	P0.8	—	A2	—	K30	—	C0.5 — R1.0
PGHT5A4	—	35.01	—	P0.8	—	A2	—	K30	—	C0.5

Days to Ship Quotation

Price Quotation

Example

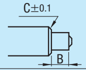
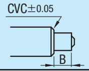

Runner lock pin (P.799~805)
Locating ring(P.791~794)
Clamping Plate
Runner stripper plate
Pin-point Gate Bushing (PGHT□A)
Fixed die plate
Cavity Insert

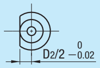
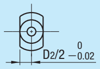
■Characteristics

Pin-point gate bushings with head are capable of positioning at depth amount of counterbore of the head in vertical direction.

Alterations

Part Number — L — P — A — K — C V S R — (CC • CVC···etc.)
PGHT1A4 — 35.01 — P0.8 — A2 — K30 — C0.5—V3.0 — CC

Alterations	Code	Spec.	1Code
 C±0.1 B	CC	C chamfering for inlay relief. D2 • 2.5 → C0.2 D3 • 4 → C0.3 D5~8 → C0.5	Quotation
 CVC±0.05 B	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2\leqq CVC<\frac{(D_2-D)}{2}-0.1$	

Alterations	Code	Spec.	1Code
 D2/2 0 −0.02	KC	Adds a single key flat on the head ⊗ L<20 not available.	Quotation
 D2/2 0 −0.02	WKC	Adds two parallel key flats on the head. ⊗ L<20 not available.	

SKH51

PIN-POINT GATE BUSHINGS WITH HEAD TAPERED GATE HOLE

—B DIMENSION SELECTION TYPE—

SKH51

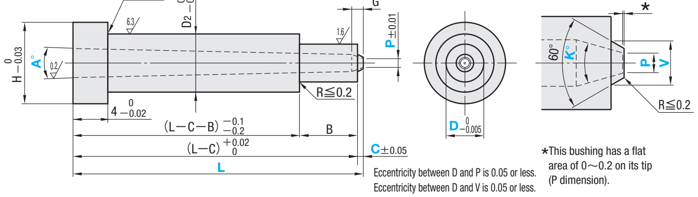
Tapered gate hole Head type

Non JIS material definition is listed on P.1351 - 1352

The inside diameter is finished by electric discharge. The angle (K°) and the secondary sprue (A°) are roundly connected.

RoHS

Shape 1A

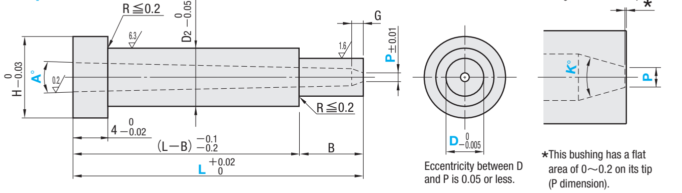

R≦0.2
D2 0 −0.05
G
P±0.01
6.3
1.6
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.02 0
C±0.05
L
D 0 −0.005
Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

Shape 2A

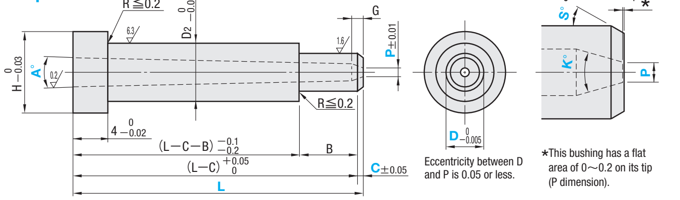

R≦0.2
D2 0 −0.05
G
P±0.01
6.3
1.6
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.02
(L−B) −0.1 −0.2
B
L +0.02 0
D 0 −0.005
Enlarged view of the tip
*
K°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

Shape 3A

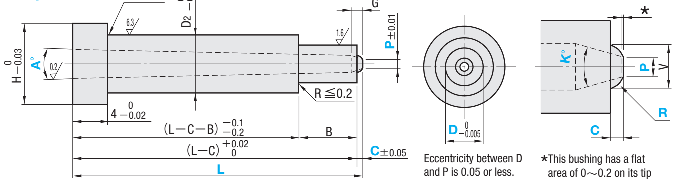

R≦0.2
D2 0 −0.05
G
P±0.01
6.3
1.6
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.005
Enlarged view of the tip
*
S°
K°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

RoHS

Shape 4A


R≦0.2
D2 0 −0.05
G
P±0.01
6.3
1.6
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.02 0
C±0.05
L
D 0 −0.005
Enlarged view of the tip
*
K°
P
V
R
C

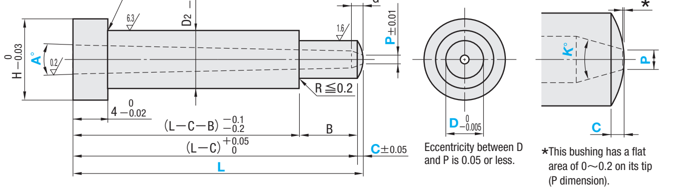
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

$R \geqq \sqrt{(P/2)^2 + C^2}$ $V = 2 \times \sqrt{R^2 - (\sqrt{R^2 - (P/2)^2} - C)^2}$

RoHS

Shape 5A

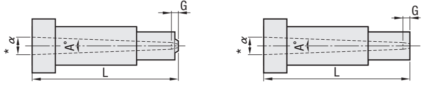

R≦0.2
D2 0 −0.05
G
P±0.01
6.3
1.6
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.02
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.005
Enlarged view of the tip
*
K°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.2 on its tip (P dimension).

- **Calculation for the inlet diameter** *α

$$*\alpha = 2\{(L-G)\tan\frac{A^\circ}{2} + G\tan\frac{K^\circ}{2}\} + P$$



The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGHVT□A	SKH51	59∼61HRC

H	D2	G	B	Part Number Type	Shape	D	L 0.01mm increments	P	A°	K°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
7	4	1.0	4	PGHVT (High Speed Steel SKH51)	1A 2A 3A 4A 5A	2.5	10.00∼25.00	0.3 0.4 0.5 0.6(*1)	1	20 30	0.2∼0.5	1.5∼2.4	1∼45	0.6∼1.0
8	5	1.2	6			3	20.00∼40.00	0.5 0.6 0.7 0.8(*2)		20 30 40	0.3∼0.8	2.0∼2.9		0.8∼1.5
9	6					4		0.6 0.7 0.8 0.9 1.0 1.2				2.5∼3.9		
11	8	1.5	10			5	20.00∼60.00	0.8 0.9 1.0 1.1 1.2(*3) 1.3(*3) 1.4(*3)	2	20 30 40 50 60	0.5∼1.5	3.5∼4.9		1.0∼2.0
12	9					6		1.0 1.1 1.2 1.3 1.4 1.5(*4) 1.6(*4)	3			4.0∼5.9	1∼50	1.5∼3.0
14	11					8		1.2 1.3 1.4 1.5 1.6				4.5∼7.9	1∼60	2.0∼4.0
16	13	2.0				10						5.0∼9.9		2.5∼5.0

For shape 4A, $R \geqq \sqrt{(P/2)^2 + C^2}$

(*1) For P0.6(D2.5), only K20° can be selected

(*2) P0.8(D3) is selected from K20° • K30°

(*3) For P1.2∼P1.4(D5), K60° not available

(*4) When P1.5 • P1.6(D6) and K30° or more, G is 1.2.

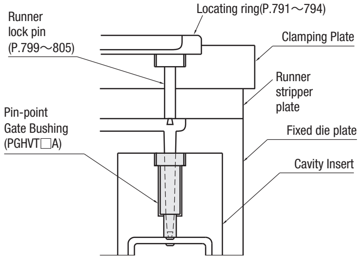
Order

Part Number	L	P	A	K	C V S R
PGHVT1A4	35.01	P0.8	A2	K30	C0.5—V3.0
PGHVT2A4	35.01	P0.8	A2	K30	
PGHVT3A4	35.01	P0.8	A2	K30	C0.5—S30
PGHVT4A4	35.01	P0.8	A2	K30	C0.5—R1.0
PGHVT5A4	35.01	P0.8	A2	K30	C0.5

Days to Ship Quotation

Price Quotation

Example

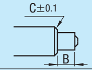
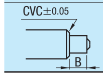

Runner lock pin (P.799∼805)
Locating ring(P.791∼794)
Clamping Plate
Runner stripper plate
Pin-point Gate Bushing (PGHVT□A)
Fixed die plate
Cavity Insert

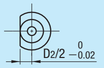
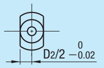
Characteristics

Pin-point gate bushings with head are capable of positioning at depth amount of counterbore of the head in vertical direction.

Alterations

Part Number	L	P	A	K	C V S R	(CC • CVC···etc.)
PGHVT1A4	35.01	P0.8	A2	K30	C0.5—V3.0	CC

Alterations	Code	Spec.	1Code
 C±0.1 B	CC	C chamfering for inlay relief. D2.5 → C0.2 D3 • 4 → C0.3 D5∼10 → C0.5	Quotation
 CVC±0.05 B	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(D_2-D)}{2} - 0.1$	

Alterations	Code	Spec.	1Code
 D2/2 0 −0.02	KC	Adds a single key flat on the head ⊗ L<20 not available.	Quotation
 D2/2 0 −0.02	WKC	Adds two parallel key flats on the head. ⊗ L<20 not available.	

SKH51

PIN-POINT GATE BUSHINGS WITH HEAD INNER DIAMETER SR

— PREPARED HOLE TYPE —

SKH51

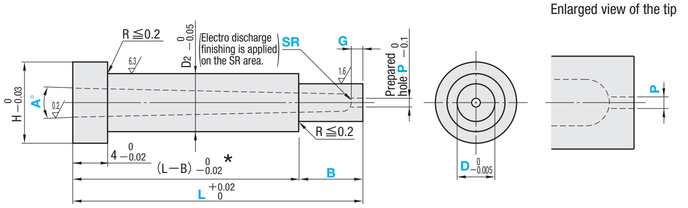
Inner diameter SR Head(with Prepared hole)

Non JIS material definition is listed on P.1351 - 1352

This product enables to alter the tip surface of the gate to fit the shape of molding products. Straight prepared (P) instead of the cutting angle (K).

RoHS

PGHTBL


R≦0.2
6.3
D2 0 −0.05
Electro discharge finishing is applied on the SR area.
SR
G
1.6
Prepared hole P 0 −0.1
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.02
(L−B) 0 −0.02 *
B
L +0.02 0
D 0 −0.005
Enlarged view of the tip
P

Eccentricity between D and P is 0.05 or less.

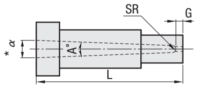
* P dimension is lower hole of straight.

M SKH51
H 59~61HRC

H	D2	Part Number		L	Prepared hole	SR	A°	G	B
		Type	D	0.01mm increments	P				0.01mm increments
8	5	PGHTBL (High Speed Steel SKH51)	3	20.00~40.00	0.4 0.5 0.6	1.00	1	1.2	5.00~ 9.00
								2.0	5.50~ 9.50
								3.0	6.50~10.50
							2	1.2	5.00~ 8.00
								2.0	5.50~ 8.50
								3.0	6.50~ 9.50
							3	1.2	5.00~ 7.00
								2.0	5.50~ 7.50
								3.0	6.50~ 8.50
9	6		4		0.4 0.5 0.6 0.7 0.8	1.00 1.25	1 2	1.2	5.00~30.00
								2.0	5.50~30.50
								3.0	6.50~31.50
							3	1.2	5.00~20.00
								2.0	5.50~20.50
								3.0	6.50~21.50
11	8		5	20.00~60.00	0.6 0.7 0.8	1.25	1 2 3	1.5	5.00~30.00
								3.0	6.50~31.50
								4.0	7.50~32.50
						1.50	1 2	1.5	5.00~30.00
								3.0	6.50~31.50
								4.0	7.50~32.50
							3	1.5	5.00~20.00
								3.0	6.50~21.50
								4.0	7.50~22.50
12	9		6		0.8	1.25 1.50	1 2 3	1.5	5.00~30.00
								3.0	6.50~31.50
								4.0	7.50~32.50
14	11		8		0.8	1.50 2.00	1 2 3	1.5	5.00~30.00
								3.0	6.50~31.50
								4.0	7.50~32.50

- **Calculation for the inlet diameter** $*\alpha$

$$*\alpha = 2SR + 2(L - G - SR)\tan\frac{A^\circ}{2}$$



The dimension acquired using the above calculation is the theoretical (reference) value.

Order

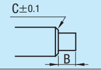
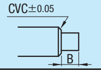
Part Number	L	P	SR	A	G	B
PGHTBL4	35.01	P0.8	SR1.00	A2	G2.0	B15.00

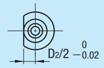
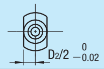
Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	SR	A	G	B	(CC · CVC · KC · WKC)
PGHTBL4	35.01	P0.8	SR1.00	A2	G2.0	B15.00	CC

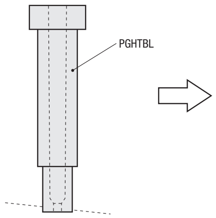
Alterations	Code	Spec.	1Code
 C±0.1 B	CC	C chamfering for inlay relief. D3・4 → C0.3 D5~8 → C0.5	Quotation
 CVC±0.05 B	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(D_2-D)}{2} - 0.1$	Quotation

Alterations	Code	Spec.	1Code
 $D_2/2$ 0 −0.02	KC	Adds a single key flat on the head	Quotation
 $D_2/2$ 0 −0.02	WKC	Adds two parallel key flats on the head.	Quotation

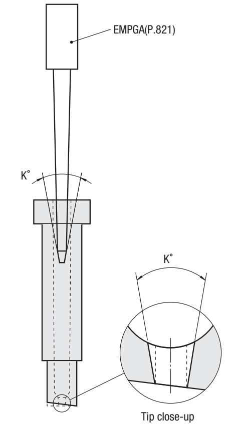
Example

■**Characteristics**

Suitable blank material of gate bushing for arranging pin-point gate bushings to molding product's spherical surface, slope surface and etc. G dimension (the distance between gate tip face and SR) can be selected longer than normal type. Additionally, due to the straight prepared hole in the G dimension, the high degree of processing freedom is possible. Customers who carved gate shape in cavity directly in the past will find the advantage that it can be maintained simply by exchanging bushings only.

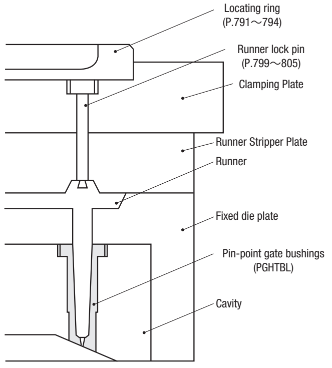


Please process the shape fit to the molding products, for the G dimension (the distance between gate tip face and SR) is available for selection.


EMPGA(P.821)
K°
K°
Tip close-up

After the end processing, please process cutting angle of the gate tip by the electrode (EMPGA P.821).

K° of EMPGA in the figure becomes G° when ordering.


Locating ring (P.791~794)
Runner lock pin (P.799~805)
Clamping Plate
Runner Stripper Plate
Runner
Fixed die plate
Pin-point gate bushings (PGHTBL)
Cavity

It's applicable to arrange a pin-point gate on the slope part of molding product

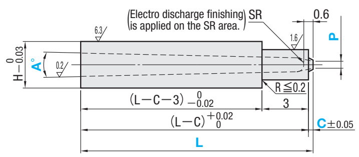
SKH51

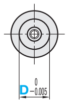
PIN-POINT GATE BUSHINGS INNER DIAMETER SR

—SMALL DIAMETER TYPE—

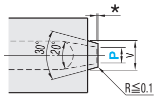
RoHS

Part Number	Type	M	H	P Dimension Tolerance
PGHS	Standard	SKH51	59~61HRC	±0.01
PGXS	Precision			±0.005


(Electro discharge finishing is applied on the SR area.) SR
0.6
6.3
1.6
P
A°
0.2
H $^{0}_{-0.03}$
R≦0.2
(L−C−3) $^{0}_{-0.02}$
3
(L−C) $^{+0.02}_{0}$
C±0.05
L



Enlarged view of the tip



*This bushing has a flat area of 0~0.2 on its tip (P dimension).

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

H	SR	V	Part Number		L	P	A°	C	U/Price 1~4	
			Type	D	0.01mm increments				PGHS	PGXS
2.5	0.4	1.2	PGHS (Standard) PGXS (Precision)	1.5	6.00~20.00	0.3	2	0 0.2 0.3 0.4 0.5	Quotation	
3		1.3		1.6		0.3 0.4				
	0.5			1.8		0.3 0.4 0.5*				

*C0.4 and C0.5 are not available when P=0.5

Order

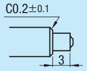
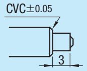
Part Number — L — P — A — C
PGHS1.5 — 15.00 — P0.3 — A2 — C0.2
PGXS1.6 — 10.00 — P0.3 — A2 — C0.4

Days to Ship Quotation

Price Quotation

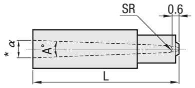
Alterations

Part Number — L — P — A — C — (CC · CVC)
PGHS1.5 — 15.00 — P0.3 — A2 — C0.2 — CC
PGXS1.6 — 10.00 — P0.3 — A2 — C0.4 — CVC0.2

Alterations	Code	Spec.	1Code
 C0.2±0.1 3	CC	C chamfering for inlay relief.	Quotation
 CVC±0.05 3	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(H-D)}{2} - 0.1$	

- **Calculation for the inlet diameter** $*\alpha$

$$*\alpha = 2SR + 2(L-0.6-SR)\tan\frac{A^\circ}{2}$$



The dimension acquired using the above calculation is the theoretical (reference) value.

SKH51

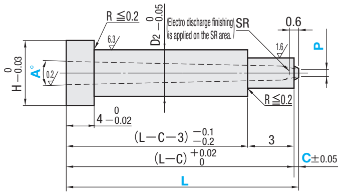
PIN-POINT GATE BUSHINGS WITH HEAD INNER DIAMETER SR

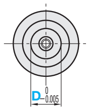
—SMALL DIAMETER TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

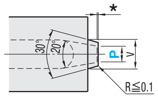
Part Number	Type	M	H	P Dimension Tolerance
PGHST	Standard	SKH51	59~61HRC	±0.01
PGXST	Precision			±0.005


R ≦0.2
D2 $^{0}_{-0.05}$
(Electro discharge finishing is applied on the SR area.) SR
0.6
6.3
1.6
P
A°
0.2
H $^{0}_{-0.03}$
R≦0.2
4 $^{0}_{-0.02}$
(L−C−3) $^{-0.1}_{-0.2}$
3
(L−C) $^{+0.02}_{0}$
C±0.05
L



Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

Enlarged view of the tip



*This bushing has a flat area of 0~0.2 on its tip (P dimension).

H	D2	SR	V	Part Number		L	P	A°	C	U/Price 1~4	
				Type	D	0.01mm increments				PGHST	PGXST
5	2.5	0.4	1.2	PGHST (Standard) PGXST (Precision)	1.5	10.00~20.00	0.3	2	0 0.2 0.3 0.4 0.5	Quotation	
6	3		1.3		1.6		0.3 0.4				
		0.5			1.8		0.3 0.4 0.5*				

*C0.4 and C0.5 are not available when P=0.5

Order

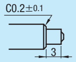
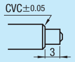
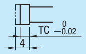
Part Number — L — P — A — C
PGHST1.5 — 15.00 — P0.3 — A2 — C0.2
PGXST1.8 — 12.00 — P0.4 — A2 — C0.4

Days to Ship Quotation

Price Quotation

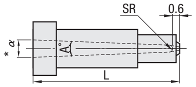
Alterations

Part Number — L — P — A — C — (CC · CVC · TC)
PGHST1.5 — 15.00 — P0.3 — A2 — C0.2 — CC
PGXST1.8 — 12.00 — P0.4 — A2 — C0.4 — CVC0.2

Alterations	Code	Spec.	1Code
 C0.2±0.1 3	CC	C chamfering for inlay relief.	Quotation
 CVC±0.05 3	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(D_2-D)}{2} - 0.1$	
 TC $^{0}_{-0.02}$ 4	TC	TC=0.1mm increments 2.0≦TC<4 L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	

- **Calculation for the inlet diameter** $*\alpha$

$$*\alpha = 2SR + 2(L-0.6-SR)\tan\frac{A^\circ}{2}$$



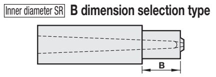
The dimension acquired using the above calculation is the theoretical (reference) value.

Electroforming

PIN-POINT GATE BUSHINGS INNER DIAMETER SR

—STANDARD・HIGH HARDNESS B DIMENSION SELECTION TYPE—

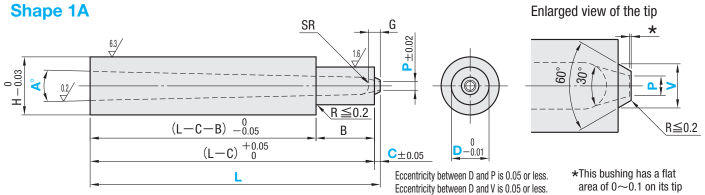
Electroforming


Inner diameter SR
B dimension selection type
B

Non JIS material definition is listed on P.1351 - 1352

RoHS

Shape 1A

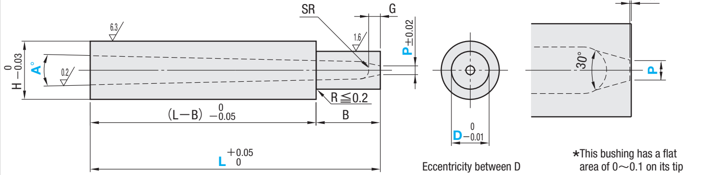

Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
D $^{0}_{-0.01}$
L
60°
30°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

RoHS

Shape 2A

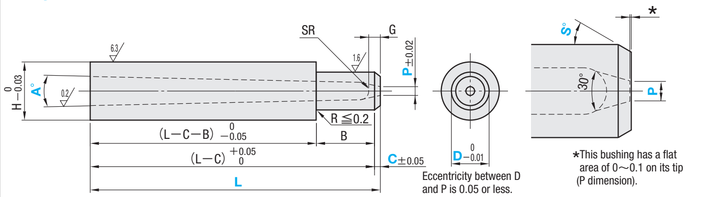

Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−B) $^{0}_{-0.05}$
B
D $^{0}_{-0.01}$
L $^{+0.05}_{0}$
30°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

RoHS

Shape 3A

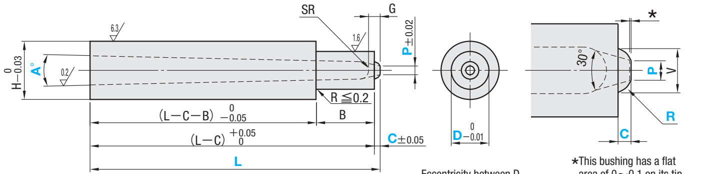

Enlarged view of the tip
*
S°
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
D $^{0}_{-0.01}$
L
30°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

RoHS

Shape 4A


Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
D $^{0}_{-0.01}$
L
30°
P
V
R
C

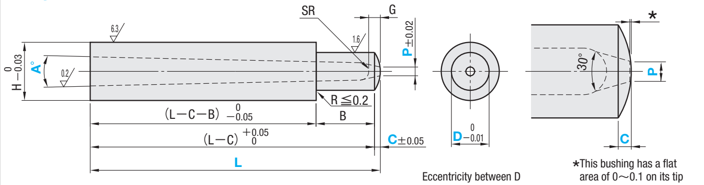
$R \geqq \sqrt{(P/2)^2 + C^2}$ $V = 2 \times \sqrt{R^2 - (\sqrt{R^2 - (P/2)^2} - C)^2}$

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

RoHS

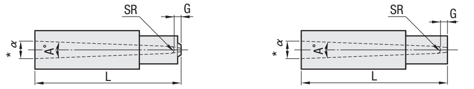
Shape 5A


Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
D $^{0}_{-0.01}$
L
30°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

● Calculation for the inlet diameter $*\alpha$ $*\alpha = 2SR + 2(L - G - SR)\tan\frac{A°}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	Type	M	H
PGEB□A	Standard	Nickel alloy	(Inside) 55~60HRC depth: 0.5 (Outside) 40~45HRC
PGKB□A	High hardness		58~62HRC (The inner and outer surface have the same hardness)

Please use the D dimension designation type PGED and PGKD (P.859), if D dimension is designated.

H	G	B	SR	Part Number Type	Shape	D	L 0.01mm increments	P	A°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S 1° increments	Shape 4A only R 0.1mm increments
3	0.7	3	0.60	PGEB (Standard type) PGKB (High hardness type)	1A	2	6.00~20.00	0.3 0.4	1	0.2~0.4	1.3~1.9	1~45	0.4~0.8
4	1.0	4	0.75			2.5	8.00~25.00	0.3 0.4 0.5		0.2~0.5	1.5~2.4		0.6~1.0
5	1.2	6	1.00		2A	3	10.00~40.00	0.5 0.6 0.7 0.8 0.9(*2)		0.3~0.8	2.0~2.9		0.8~1.5
6			1.00			4		0.6 0.7			2.5~3.9		
			1.25					0.8 0.9 1.0 1.2					
8	1.5	10	1.25		3A	5	15.00~80.00(*1)	0.8 0.9 1.0	2	0.5~1.5	3.5~4.9		1.0~2.0
			1.50					1.2 1.4 1.5(*3)					
9			1.25		4A	6		1.0	3		4.0~5.9	1~50	1.5~3.0
			1.50					1.2 1.4 1.5(*3) 1.6(*3) 1.8(*5)					
11			1.50		5A	8		1.2 1.4 1.5(*3)			4.5~7.9	1~60	2.0~4.0
			2.00					1.6 1.8(*4) 2.0(*5)					

(*1) PGKB will be available for maximum L dememsion as 60.
(*2) When P0.9(D3), G is 1.0.
(*3) When P1.5(D5・D6・D8)・P1.6(D6), G is 1.2.
(*4) When P1.8(D8), G is 1.1.
(*5) When P1.8(D6)・P2.0(D8), G is 0.8.

For shape 4A, $R \geqq \sqrt{(P/2)^2 + C^2}$

(*4)(*5) P1.8・P2.0 are not available for PGKB.

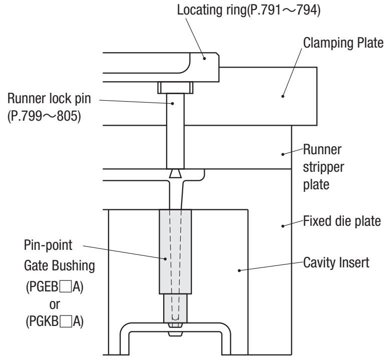
Order

Part Number		L		P		A		C V S R
PGEB1A4	—	20.01	—	P0.8	—	A2	—	C0.5 — V3.0
PGEB2A4	—	20.01	—	P0.8	—	A2		
PGEB3A4	—	20.01	—	P0.8	—	A2	—	C0.5 — S30
PGEB4A4	—	20.01	—	P0.8	—	A2	—	C0.5 — R1.0
PGEB5A4	—	20.01	—	P0.8	—	A2	—	C0.5

Days to Ship Quotation

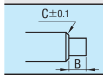
Price Quotation

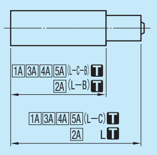
Example


Locating ring(P.791~794)
Clamping Plate
Runner lock pin
(P.799~805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing
(PGEB□A)
or
(PGKB□A)
Cavity Insert

Alterations

Part Number — L — P — A — C V S R — (CC・LKC)
PGEB1A4 — 20.01 — P0.8 — A2 — C0.5—V3.0 — CC

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D2・2.5 → C0.2 D3・4 → C0.3 D5~8 → C0.5	Quotation

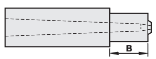
Alterations	Code	Spec.		1Code
	LKC	Changes the tolerances of the dimensions below.		Quotation
		1A	(L−C−B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$	
		4A	(L−C) $^{+0.05}_{0}$ ···› $^{+0.02}_{0}$	
		2A	(L−B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$	
			L $^{+0.05}_{0}$ ···› $^{+0.02}_{0}$	
		3A	(L−C−B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$	
		5A	The tolerance of L−C remains $^{+0.05}_{0}$ unchanged.	

1A 3A 4A 5A (L−C−B) T
2A (L−B) T
1A 3A 4A 5A (L−C) T
2A L T

PIN-POINT GATE BUSHINGS TAPERED GATE HOLE

—STANDARD・B DIMENSION SELECTION TYPE—

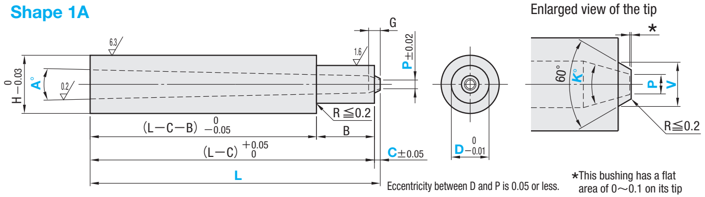
Tapered gate hole B dimension selection type



The angle (K°) and the secondary sprue (A°) are roundly connected.

RoHS

Shape 1A

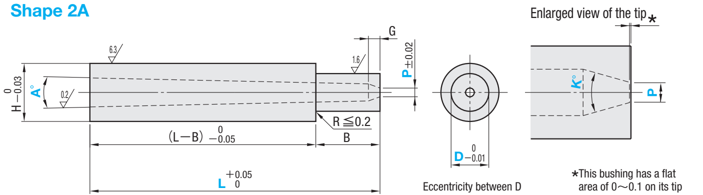

G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

RoHS

Shape 2A

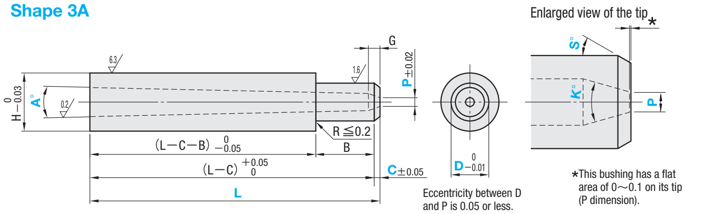

G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
(L−B) 0 −0.05
B
L +0.05 0
D 0 −0.01
Enlarged view of the tip
*
K°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

RoHS

Shape 3A

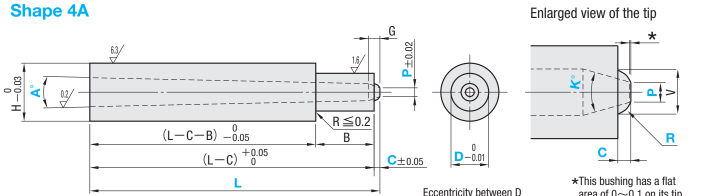

G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
*
S°
K°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

RoHS

Shape 4A


G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
*
K°
P
V
R
C

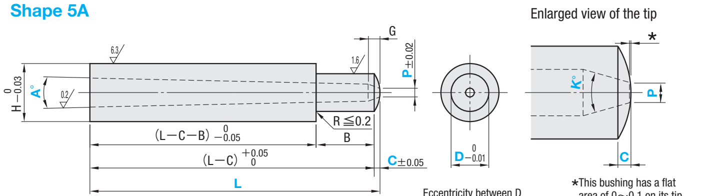
$R \geqq \sqrt{(P/2)^2 + C^2}$ $V = 2 \times \sqrt{R^2 - (\sqrt{R^2 - (P/2)^2} - C)^2}$

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

RoHS

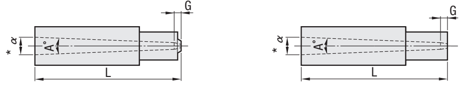
Shape 5A


G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
(L−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
*
K°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

- **Calculation for the inlet diameter** *α $*\alpha = 2\{(L-G)\tan\frac{A^\circ}{2} + G\tan\frac{K^\circ}{2}\} + P$



The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	Type	M	H
PGEBV□A	Standard	Nickel alloy	(Inside) 55～60HRC depth: 0.5 (Outside) 40～45HRC

Non JIS material definition is listed on P.1351 - 1352

H	G	B	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	K°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1°increments	Shape 4A only R 0.1mm increments
5	1.2	6	PGEBV (Standard type)	1A	3	10.00～40.00	0.6 0.8	2	30	0.3～0.8	2.0～2.9		0.8～1.5
6				2A	4		0.6 0.8 1.0 1.2				2.5～3.9	1～45	
				3A									
8	1.5	10		4A	5	15.00～60.00	1.0 1.2 1.4	3	40	0.5～1.5	3.5～4.9		1.0～2.0
9				5A	6		1.0 1.2 1.4				4.0～5.9	1～50	1.5～3.0

For shape 4A, $R \geqq \sqrt{(P/2)^2 + C^2}$

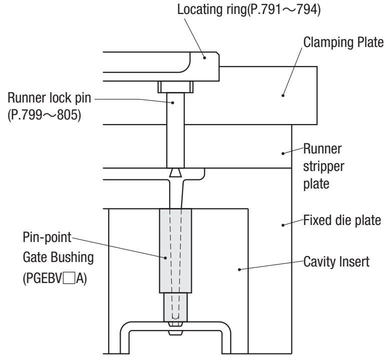
Order

Part Number	—	L	—	P	—	A	—	K	—	C V S R
PGEBV1A4	—	20.01	—	P0.8	—	A2	—	30	—	C0.5 — V3.0
PGEBV2A4	—	20.01	—	P0.8	—	A2	—	30		
PGEBV3A4	—	20.01	—	P0.8	—	A2	—	30	—	C0.5 — S30
PGEBV4A4	—	20.01	—	P0.8	—	A2	—	30	—	C0.5 — R1.0
PGEBV5A4	—	20.01	—	P0.8	—	A2	—	30	—	C0.5

Days to Ship Quotation

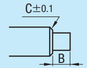
Price Quotation

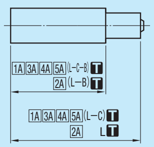
Example


Locating ring(P.791～794)
Clamping Plate
Runner lock pin (P.799～805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGEBV□A)
Cavity Insert

Alterations

Part Number — L — P — A — K — C V S R — (CC・LKC)
PGEBV1A4 — 20.01 — P0.8 — A2 — 30 — C0.5—V3.0 — CC

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D3・4 → C0.3 D5・6 → C0.5	Quotation

Alterations	Code	Spec.				1Code
	LKC	Changes the tolerances of the dimensions below.				Quotation
		1A	(L−C−B)	$^{0}_{-0.05}$ ···›	$^{0}_{-0.02}$	
		4A	(L−C)	$^{+0.05}_{0}$ ···›	$^{+0.02}_{0}$	
		2A	(L−B)	$^{0}_{-0.05}$ ···›	$^{0}_{-0.02}$	
			L	$^{+0.05}_{0}$ ···›	$^{+0.02}_{0}$	
		3A	(L−C−B)	$^{0}_{-0.05}$ ···›	$^{0}_{-0.02}$	
		5A	The tolerance of L−C remains $^{+0.05}_{0}$ unchanged.			

1A 3A 4A 5A (L−C−B) T
2A (L−B) T
1A 3A 4A 5A (L−C) T
2A L T

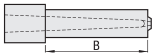
Electroforming

PIN-POINT GATE BUSHINGS INNER DIAMETER SR

—STANDARD · HIGH HARDNESS B DIMENSION DESIGNATION TYPE—

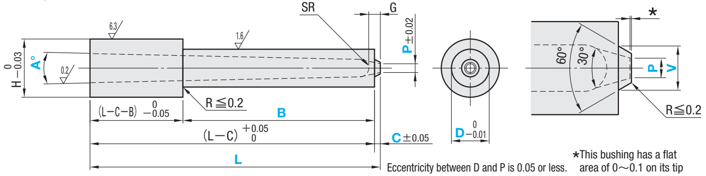
Electroforming

Inner diameter SR B dimension designation type



RoHS

Shape 1A


SR
G
6.3
1.6
0.2
H −0.03 0
A°
(L−C−B) −0.05 0
R≦0.2
B
(L−C) +0.05 0
L
C±0.05
D −0.01 0
P±0.02
Enlarged view of the tip
*
60°
30°
P
V
R≦0.2

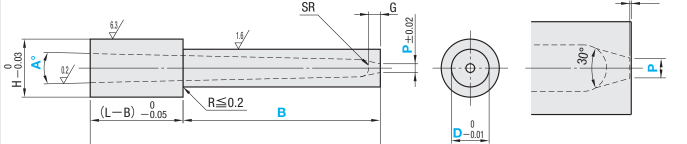
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0∼0.1 on its tip (P dimension).

(L−C−B)≧3.0

RoHS

Shape 2A


SR
G
6.3
1.6
0.2
H −0.03 0
A°
(L−B) −0.05 0
R≦0.2
B
L +0.05 0
D −0.01 0
P±0.02
Enlarged view of the tip
*
30°
P

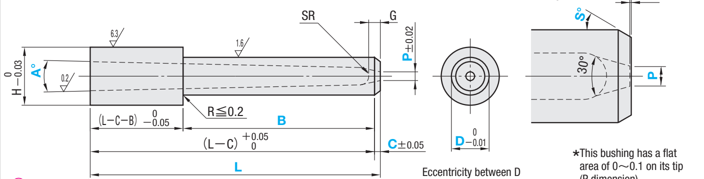
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.1 on its tip (P dimension).

(L−B)≧3.0

RoHS

Shape 3A


SR
G
6.3
1.6
0.2
H −0.03 0
A°
(L−C−B) −0.05 0
R≦0.2
B
(L−C) +0.05 0
L
C±0.05
D −0.01 0
P±0.02
Enlarged view of the tip
*
S°
30°
P

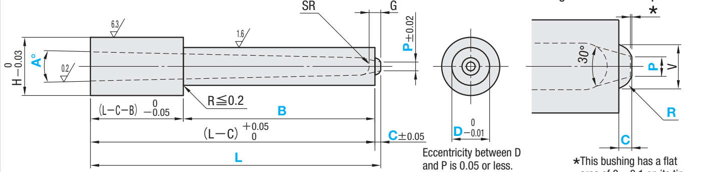
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.1 on its tip (P dimension).

(L−C−B)≧3.0

RoHS

Shape 4A


SR
G
6.3
1.6
0.2
H −0.03 0
A°
(L−C−B) −0.05 0
R≦0.2
B
(L−C) +0.05 0
L
C±0.05
D −0.01 0
P±0.02
Enlarged view of the tip
*
30°
P
V
R
C

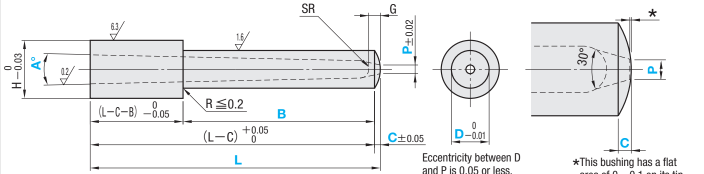
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.1 on its tip (P dimension).

(L−C−B)≧3.0 $R \geqq \sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

Shape 5A

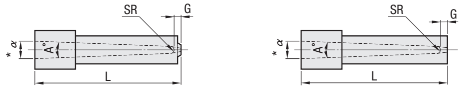

SR
G
6.3
1.6
0.2
H −0.03 0
A°
(L−C−B) −0.05 0
R≦0.2
B
(L−C) +0.05 0
L
C±0.05
D −0.01 0
P±0.02
Enlarged view of the tip
*
30°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0∼0.1 on its tip (P dimension).

(L−C−B)≧3.0

- **Calculation for the inlet diameter** $*\alpha$ $*\alpha=2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	Type	M	H
PGE□A	Standard	Nickel alloy	(Inside) 55∼60HRC depth: 0.5 (Outside) 40∼45HRC
PGK□A	High hardness		58∼62HRC (The inner and outer surface have the same hardness)

Non JIS material definition is listed on P.1351 - 1352

Please use the D dimension designation type PGED and PGKD (P.859), if D dimension is designated.

H	G	SR	Part Number			L 0.01mm increments	P	A°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
			Type	Shape	D								
3	0.7	0.60	PGE (Standard type) PGK (High hardness type)	1A 2A 3A 4A 5A	2	6.00∼20.00	0.3 0.4	1	3.00∼ 5.00	0.2∼0.4	1.3∼1.9	1∼45	0.4∼0.8
								2					
								3					
4	1.0	0.75			2.5	8.00∼25.00	0.3 0.4 0.5	1	4.00∼ 6.00	0.2∼0.5	1.5∼2.4		0.6∼1.0
								2					
								3					
5	1.2	1.00			3	10.00∼40.00	0.5 0.6 0.7 0.8 0.9(*2)	1	5.00∼ 9.00	0.3∼0.8	2.0∼2.9		0.8∼1.5
								2	5.00∼ 8.00				
								3	5.00∼ 7.00				
6		1.00			4		0.6 0.7	1	5.00∼30.00		2.5∼3.9		
								2	5.00∼30.00				
								3	5.00∼20.00				
		1.25					0.8 0.9 1.0 1.2	1	5.00∼30.00				
								2	5.00∼30.00				
								3	5.00∼20.00				
8	1.5	1.25			5	15.00∼80.00(*1)	0.8 0.9 1.0	1	5.00∼35.00	0.5∼1.5	3.5∼4.9		1.0∼2.0
								2	5.00∼30.00				
								3	5.00∼30.00				
		1.50					1.2 1.4 1.5(*3)	1	5.00∼30.00				
								2	5.00∼30.00				
								3	5.00∼20.00				
9		1.25			6		1.0	1	5.00∼50.00		4.0∼5.9	1∼50	1.5∼3.0
								2	5.00∼50.00				
								3	5.00∼40.00				
		1.50					1.2 1.4 1.5(*3) 1.6(*3) 1.8(*5)	1	5.00∼40.00				
								2	5.00∼40.00				
								3	5.00∼30.00				
11		1.50			8		1.2 1.4 1.5(*3)	1	5.00∼50.00		4.5∼7.9	1∼60	2.0∼4.0
								2					
								3					
		2.00					1.6 1.8(*4) 2.0(*5)	1					
								2					
								3					

(*1) PGK will be available for maximum L dememsion as 60.
(*2) When P0.9(D3), G is 1.0.
(*3) When P1.5(D5 • D6 • D8) • P1.6(D6), G is 1.2.
(*4) When P1.8(D8), G is 1.1.
(*5) When P1.8(D6) • P2.0(D8), G is 0.8.

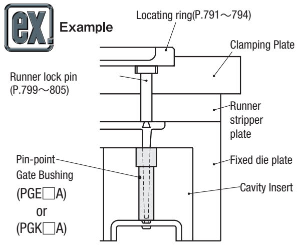
For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

(*4)(*5) P1.8 • P2.0 are not available for PGK.

Order

Part Number	L	P	A	B	C V S R
PGE1A4	20.01	P0.8	A2	B15.00	C0.5—V3.0
PGE2A4	20.01	P0.8	A2	B15.00	
PGE3A4	20.01	P0.8	A2	B15.00	C0.5—S30
PGE4A4	20.01	P0.8	A2	B15.00	C0.5—R1.0
PGE5A4	20.01	P0.8	A2	B15.00	C0.5

Example

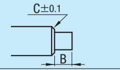
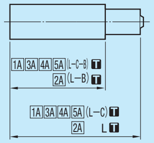

Locating ring(P.791∼794)
Clamping Plate
Runner lock pin (P.799∼805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGE□A) or (PGK□A)
Cavity Insert

Days to Ship Quotation

Price Quotation

Alterations

Part Number	L	P	A	B	C V S R	(CC · LKC)
PGE1A4	20.01	P0.8	A2	B15.00	C0.5—V3.0	CC

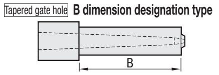
Alterations	Code	Spec.	1 Code
	CC	C chamfering for inlay relief. D2 • 2.5 → C0.2 D3 • 4 → C0.3 D5∼8 → C0.5	Quotation
	LKC	Changes the tolerances of the dimensions below. 1A (L−C−B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$ 4A (L−C) $^{+0.05}_{0}$ ···› $^{+0.02}_{0}$ 2A (L−B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$ 2A L $^{+0.05}_{0}$ ···› $^{+0.02}_{0}$ 3A (L−C−B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$ 5A The tolerance of L−C remains $^{+0.05}_{0}$ unchanged.	

C±0.1
B
1A 3A 4A 5A (L−C−B) T
2A (L−B) T
1A 3A 4A 5A (L−C) T
2A L T

Electroforming PIN-POINT GATE BUSHINGS TAPERED GATE HOLE

—STANDARD・B DIMENSION DESIGNATION TYPE—

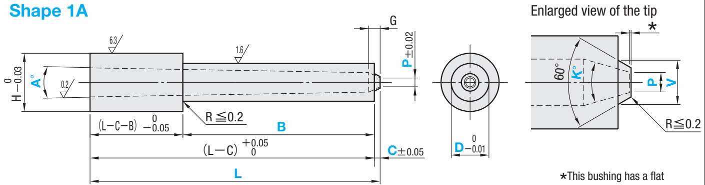
Electroforming


Tapered gate hole
B dimension designation type
B

Ⓘ The angle (K°) and the secondary sprue (A°) are roundly connected.

RoHS

Shape 1A


Enlarged view of the tip
G
P±0.02
6.3
1.6
H −0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
D 0 −0.01
L
60°
K°
P
V
R≦0.2
*

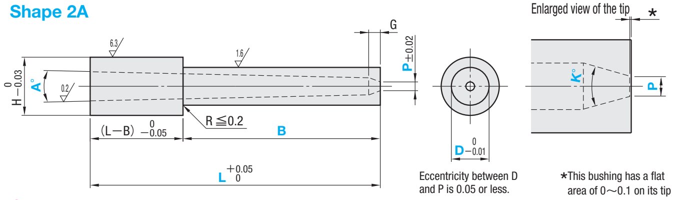
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Ⓘ (L−C−B)≧3.0

RoHS

Shape 2A


Enlarged view of the tip
G
P±0.02
6.3
1.6
H −0.03 0
A°
0.2
R≦0.2
(L−B) 0 −0.05
B
L +0.05 0
D 0 −0.01
K°
P
*

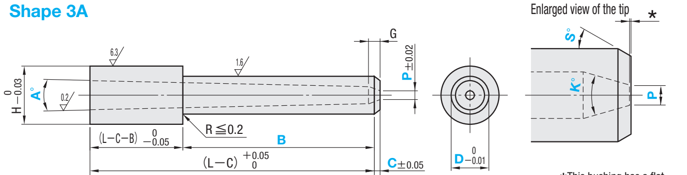
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Ⓘ (L−B)≧3.0

RoHS

Shape 3A


Enlarged view of the tip
G
P±0.02
6.3
1.6
H −0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
D 0 −0.01
L
S°
K°
P
*

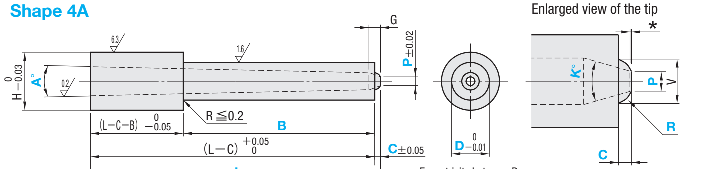
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Ⓘ (L−C−B)≧3.0

RoHS

Shape 4A


Enlarged view of the tip
G
P±0.02
6.3
1.6
H −0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
D 0 −0.01
L
K°
P
V
R
C
*

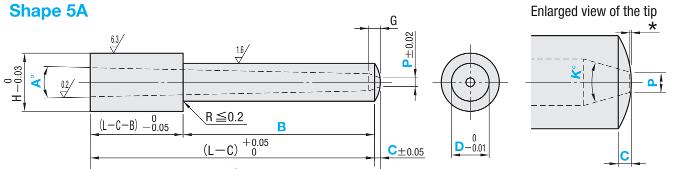
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Ⓘ (L−C−B)≧3.0 Ⓘ $R \geqq \sqrt{(P/2)^2+C^2}$ Ⓘ $V=2\times\sqrt{R^2-\left(\sqrt{R^2-(P/2)^2}-C\right)^2}$

RoHS

Shape 5A


Enlarged view of the tip
G
P±0.02
6.3
1.6
H −0.03 0
A°
0.2
R≦0.2
(L−C−B) 0 −0.05
B
(L−C) +0.05 0
C±0.05
D 0 −0.01
L
K°
P
C
*

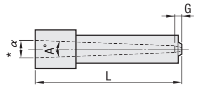
Eccentricity between D and P is 0.05 or less.

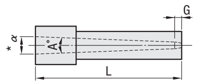
*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Ⓘ (L−C−B)≧3.0

- **Calculation for the inlet diameter** *α

$$*\alpha=2\{(L-G)\tan\frac{A^\circ}{2}+G\tan\frac{K^\circ}{2}\}+P$$





Ⓘ The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	Type	M	H
PGEV□A	Standard	Nickel alloy	(Inside) 55~60HRC depth: 0.5 (Outside) 40~45HRC

Ⓘ Non JIS material definition is listed on P.1351 - 1352

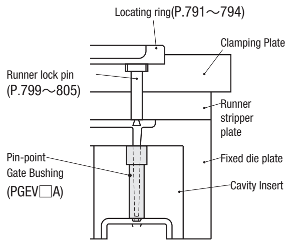
H	G	Part Number Type	Shape	D	L 0.01mm increments	P	A°	K°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only Ⓘ R 0.1mm increments
5	1.2	PGEV (Standard type)	1A	3	10.00~40.00	0.6 0.8	2	30	5.00~ 8.00	0.3~0.8	2.0~2.9	1~45	0.8~1.5
							3		5.00~ 7.00				
6			2A	4		0.6 0.8 1.0 1.2	2		5.00~30.00		2.5~3.9		
							3		5.00~20.00				
8	1.5		3A	5	15.00~60.00	1.0	2		5.00~30.00	0.5~1.5	3.5~4.9		1.0~2.0
							3		5.00~30.00				
						1.2 1.4	2		5.00~30.00				
							3		5.00~20.00				
9			4A	6		1.0	2	40	5.00~50.00		4.0~5.9	1~50	1.5~3.0
			5A				3		5.00~40.00				
						1.2 1.4	2		5.00~40.00				
							3		5.00~30.00				

Ⓘ For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

Order

Part Number	L	P	A	K	B	C V S R
PGEV1A4	20.01	P0.8	A2	30	B15.00	C0.5—V3.0
PGEV2A4	20.01	P0.8	A2	30	B15.00	
PGEV3A4	20.01	P0.8	A2	30	B15.00	C0.5—S30
PGEV4A4	20.01	P0.8	A2	30	B15.00	C0.5—R1.0
PGEV5A4	20.01	P0.8	A2	30	B15.00	C0.5

Example

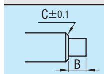

Locating ring(P.791~794)
Clamping Plate
Runner lock pin (P.799~805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGEV□A)
Cavity Insert

Days to Ship Quotation

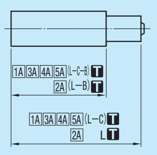
Price Quotation

Alterations

Part Number	L	P	A	K	B	C V S R	(CC・LKC)
PGEV1A4	20.01	P0.8	A2	30	B15.00	C0.5—V3.0	CC

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D3・4 → C0.3 D5・6 → C0.5	Quotation

C±0.1, B

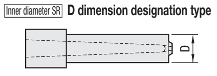
Alterations	Code	Spec.			1Code
	LKC	Changes the tolerances of the dimensions below.			Quotation
		1A	(L−C−B)	$^{0}_{-0.05}$ ⋯› $^{0}_{-0.02}$	
		4A	(L−C)	$^{+0.05}_{0}$ ⋯› $^{+0.02}_{0}$	
		2A	(L−B)	$^{0}_{-0.05}$ ⋯› $^{0}_{-0.02}$	
			L	$^{+0.05}_{0}$ ⋯› $^{+0.02}_{0}$	
		3A	(L−C−B)	$^{0}_{-0.05}$ ⋯› $^{0}_{-0.02}$	
		5A	Ⓘ The tolerance of L−C remains $^{+0.05}_{0}$ unchanged.		

1A 3A 4A 5A (L−C−B) T
2A (L−B) T
1A 3A 4A 5A (L−C) T
2A L T

Electroforming PIN-POINT GATE BUSHINGS INNER DIAMETER SR

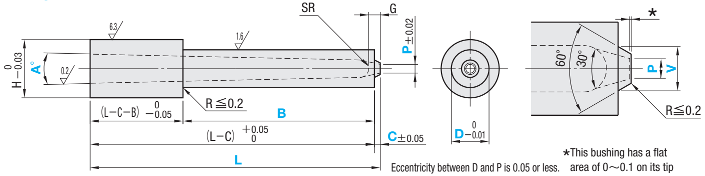
—STANDARD・HIGH HARDNESS D DIMENSION DESIGNATION TYPE—

Electroforming


Inner diameter SR
D dimension designation type
D

RoHS

Shape 1A


Enlarged view of the tip
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
L
D $^{0}_{-0.01}$
60°
30°
P
V
*
R≦0.2

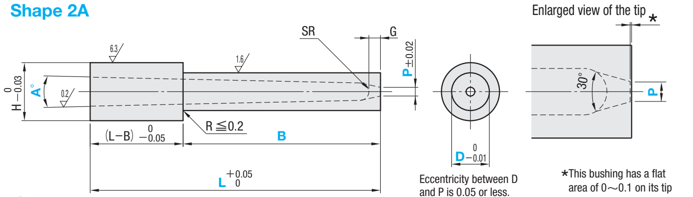
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

(L—C—B)≧3.0

RoHS

Shape 2A


Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−B) $^{0}_{-0.05}$
B
L $^{+0.05}_{0}$
D $^{0}_{-0.01}$
30°
P

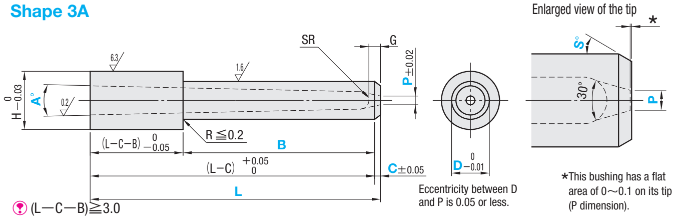
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

(L—B)≧3.0

RoHS

Shape 3A


Enlarged view of the tip
*
S°
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
L
D $^{0}_{-0.01}$
30°
P

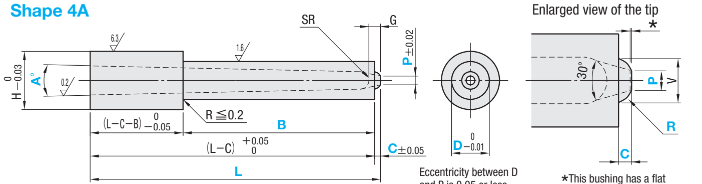
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

(L—C—B)≧3.0

RoHS

Shape 4A


Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
L
D $^{0}_{-0.01}$
30°
P
V
R
C

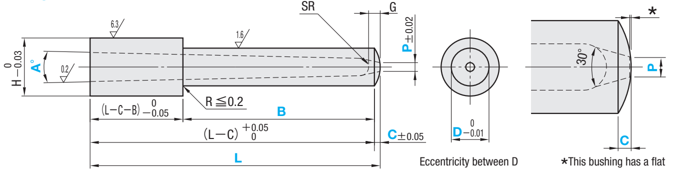
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

(L—C—B)≧3.0 $R\geqq\sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

Shape 5A

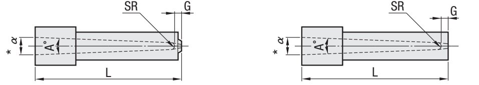

Enlarged view of the tip
*
SR
G
6.3
1.6
0.2
H $^{0}_{-0.03}$
A°
P±0.02
R≦0.2
(L−C−B) $^{0}_{-0.05}$
B
(L−C) $^{+0.05}_{0}$
C±0.05
L
D $^{0}_{-0.01}$
30°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0～0.1 on its tip (P dimension).

(L—C—B)≧3.0

- **Calculation for the inlet diameter** *α $*\alpha=2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	Type	M	H
PGED□A	Standard	Nickel alloy	(Inside) 55～60HRC depth: 0.5 (Outside) 40～45HRC
PGKD□A	High hardness		58～62HRC (The inner and outer surface have the same hardness)

Non JIS material definition is listed on P.1351 - 1352

H	G	SR	Part Number Type	Shape	No.	L 0.01mm increments	D 0.01mm increments	P	A°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1°increments	Shape 4A only R 0.1mm increments
4	1.0	0.75	PGED (Standard type) PGKD (High hardness type)	1A 2A 3A 4A 5A	2.5	8.00～25.00	2.51～ 3.00	0.3 0.4 0.5	1	4.00～ 6.00	0.2～0.5	1.5～2.4	1～45	0.6～1.0
									2					
									3					
5	1.2	1.00			3	10.00～40.00	3.01～ 4.00	0.5 0.6 0.7 0.8 0.9(*1)	1	5.00～ 9.00	0.3～0.8	2.0～2.9		0.8～1.5
									2	5.00～ 8.00				
									3	5.00～ 7.00				
6		1.00			4		4.01～ 5.00	0.6 0.7	1	5.00～30.00		2.5～3.9		
									2					
									3	5.00～20.00				
		1.25						0.8 0.9 1.0 1.2	1	5.00～30.00				
									2					
									3	5.00～20.00				
8	1.5	1.25			5	15.00～60.00	5.01～ 7.00	0.8 0.9 1.0	1	5.00～35.00	0.5～1.5	3.5～4.9		1.0～2.0
									2	5.00～30.00				
									3					
		1.50						1.2 1.4 1.5(*2)	1	5.00～30.00				
									2					
									3	5.00～20.00				
9		1.25			6		6.01～ 8.00	1.0	1	5.00～50.00		4.0～4.9	1～50	1.5～3.0
									2					
									3	5.00～40.00				
		1.50						1.2 1.4 1.5(*2) 1.6(*2)	1	5.00～40.00				
									2					
									3	5.00～30.00				
11		1.50			8		8.01～10.00	1.2 1.4 1.5(*2)	1	5.00～50.00		4.5～7.9	1～60	2.0～4.0
									2					
									3					
		2.00						1.6	1					
									2					
									3					

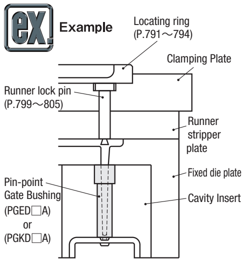
For shape 4A, $R\geqq\sqrt{(P/2)^2+C^2}$

(*1) When P0.9(No.3), G is 1.0.
(*2) When P1.5 (No.5・No.6・No.8)・When P1.6(No.6), G is 1.2.

Order

Part Number	—	L	—	D	—	P	—	A	—	B	—	C V S R
PGED1A3	—	20.01	—	D3.50	—	P0.8	—	A2	—	B5.00	—	C0.5—V2.9
PGED2A3	—	20.01	—	D3.50	—	P0.8	—	A2	—	B5.00		
PGED3A3	—	20.01	—	D3.50	—	P0.8	—	A2	—	B5.00	—	C0.5—S30
PGED4A3	—	20.01	—	D3.50	—	P0.8	—	A2	—	B5.00	—	C0.5—R1.0
PGED5A3	—	20.01	—	D3.50	—	P0.8	—	A2	—	B5.00	—	C0.5

Example

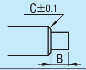
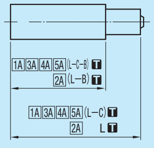

Locating ring (P.791～794)
Clamping Plate
Runner lock pin (P.799～805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGED□A) or (PGKD□A)
Cavity Insert

Days to Ship Quotation

Price Quotation

Alterations

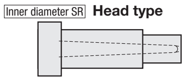
Part Number — L — D — P — A — B — C V S R — (CC・LKC)
PGED1A3 — 20.01 — D3.50 — P0.8 — A2 — B5.00 — C0.5—V2.9 — CC

Alterations	Code	Spec.		1Code
	CC	C chamfering for inlay relief. No.2.5 → C0.2 No.3・4 → C0.3 No.5～8 → C0.5		Quotation
	LKC	Changes the tolerances of the dimensions below.		
		1A 4A	(L—C—B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$	
			(L—C) $^{+0.05}_{0}$ ···› $^{+0.02}_{0}$	
		2A	(L—B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$	
			L $^{+0.05}_{0}$ ···› $^{+0.02}_{0}$	
		3A 5A	(L—C—B) $^{0}_{-0.05}$ ···› $^{0}_{-0.02}$	
			The tolerance of L—C remains $^{+0.05}_{0}$ unchanged.	

C±0.1
B
1A 3A 4A 5A (L−C−B) T
2A (L−B) T
1A 3A 4A 5A (L−C) T
2A L T

Electroforming PIN-POINT GATE BUSHINGS WITH HEAD INNER DIAMETER SR
—STANDARD・HIGH HARDNESS—

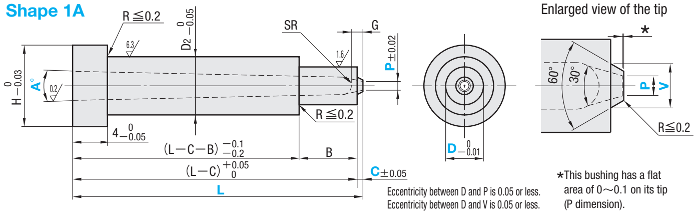
Electroforming


Inner diameter SR
Head type

Non JIS material definition is listed on P.1351 - 1352

Shape 1A

RoHS

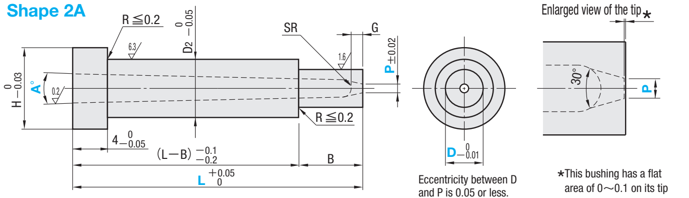

R≦0.2
D2 0 −0.05
SR
G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.05
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
60°
30°
P
V
R≦0.2

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Shape 2A

RoHS

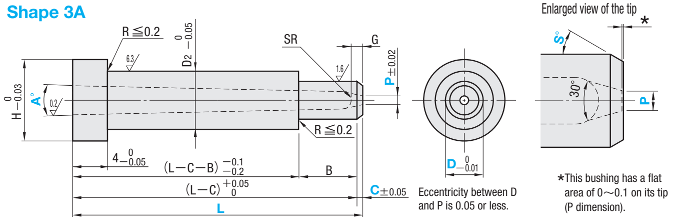

R≦0.2
D2 0 −0.05
SR
G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.05
(L−B) −0.1 −0.2
B
L +0.05 0
D 0 −0.01
Enlarged view of the tip
30°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Shape 3A

RoHS

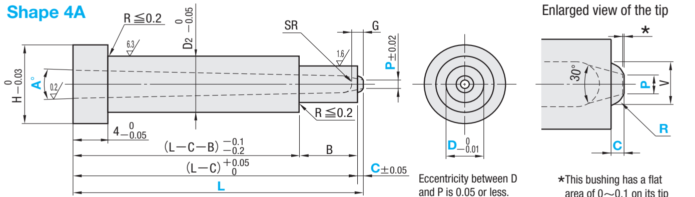

R≦0.2
D2 0 −0.05
SR
G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.05
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
S°
30°
P

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

Shape 4A

RoHS


R≦0.2
D2 0 −0.05
SR
G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.05
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
30°
P
V
R
C

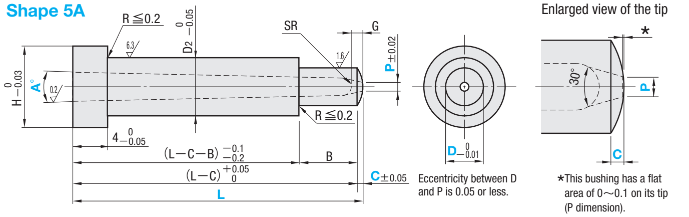
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

$R \geqq \sqrt{(P/2)^2+C^2}$ $V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

Shape 5A

RoHS

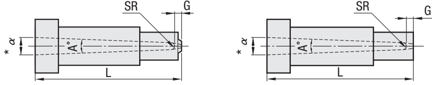

R≦0.2
D2 0 −0.05
SR
G
6.3
1.6
P±0.02
H 0 −0.03
A°
0.2
R≦0.2
4 0 −0.05
(L−C−B) −0.1 −0.2
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.01
Enlarged view of the tip
30°
P
C

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.1 on its tip (P dimension).

● Calculation for the inlet diameter *α

$*\alpha = 2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$


SR
G
*α
A°
L
SR
G
*α
A°
L

The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	Type	M	H
PGET□A	Standard	Nickel alloy	(Inside) 55~60HRC depth: 0.5 (Outside) 40~45HRC
PGKT□A	High hardness		58~62HRC (The inner and outer surface have the same hardness)

H	D2	G	B	SR	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	C (None for 2A) 0.1mm increments	V (Shape 1A only) 0.1mm increments	S° (Shape 3A only) 1° increments	R (Shape 4A only) 0.1mm increments
6	3	0.7	3	0.60	PGET (Standard type) PGKT (High hardness type)	1A 2A 3A 4A 5A	2	10.00~20.00	0.3 0.4	1	0.2~0.4	1.3~1.9	1~45	0.4~0.8
7	4	1.0	4	0.75			2.5	10.00~25.00	0.3 0.4 0.5		0.2~0.5	1.5~2.4		0.6~1.0
8	5	1.2	6	1.00			3	15.00~40.00	0.5 0.6 0.7 0.8 0.9(*1)		0.3~0.8	2.0~2.9		0.8~1.5
9	6			1.00			4		0.6 0.7			2.5~3.9		
				1.25					0.8 0.9 1.0 1.2					
11	8	1.5	10	1.25			5	20.00~60.00	0.8 0.9 1.0	2	0.5~1.5	3.5~4.9		1.0~2.0
				1.50					1.2 1.4 1.5(*2)					
12	9			1.25			6		1.0	3		4.0~5.9	1~50	1.5~3.0
				1.50					1.2 1.4 1.5(*2)1.6(*2)					
14	11			1.50			8		1.2 1.4 1.5(*2)			4.5~7.9	1~60	2.0~4.0
				2.00					1.6					

For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

(*1) When P0.9(D3), G is 1.0.
(*2) When P1.5(D5・D6・D8)・P1.6(D6), G is 1.2.

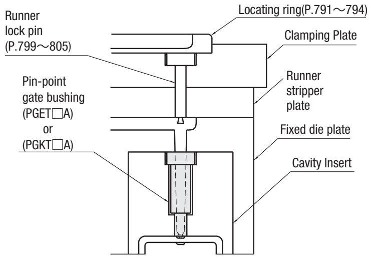
Order

Part Number	L	P	A	C V S R
PGET1A4	35.01	P0.8	A2	C0.5—V3.0
PGET2A4	35.01	P0.8	A2	
PGET3A4	35.01	P0.8	A2	C0.5—S30
PGET4A4	35.01	P0.8	A2	C0.5—R1.0
PGET5A4	35.01	P0.8	A2	C0.5

Days to Ship Quotation

Price Quotation

Example

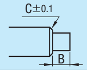

Runner lock pin (P.799~805)
Locating ring(P.791~794)
Clamping Plate
Pin-point gate bushing (PGET□A) or (PGKT□A)
Runner stripper plate
Fixed die plate
Cavity Insert

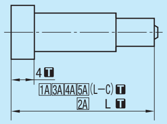
■Characteristics

Pin-point gate bushings with head are capable of positioning at depth amount of counterbore of the head in vertical direction.

Alterations

Part Number	L	P	A	C V S R	(CC・LKC)
PGKT1A4	35.01	P0.8	A2	C0.5—V3.0	CC

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D2・2.5 → C0.2 D3・4 → C0.3 D5~8 → C0.5	Quotation

Alterations	Code	Spec.			1Code
	LKC	Changes the tolerances of the dimensions below.			Quotation
		1A 4A	4	0 −0.05 → 0 −0.02	
			(L−C)	+0.05 0 → +0.02 0	
		2A	4	0 −0.05 → 0 −0.02	
			L	+0.05 0 → +0.02 0	
		3A 5A	4	0 −0.05 → 0 −0.02	
			The tolerance of L−C remains +0.05 0 unchanged.		
		When 1A~5A, the tolerances of L−C−B and L−B remain −0.1 −0.2 unchanged.			

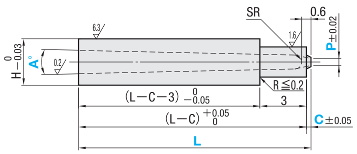
Electroforming

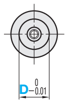
PIN-POINT GATE BUSHINGS INNER DIAMETER SR

—SMALL DIAMETER TYPE—

RoHS

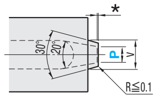
Part Number	Type	M	H
PGES	Standard	Nickel alloy	(Inside) 55～60HRC depth: 0.5 (Outside) 40～45HRC
PGKS	High hardness		58～62HRC (The inner and outer surface have the same hardness)





Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

Enlarged view of the tip



*This bushing has a flat area of 0～0.1 on its tip (P dimension).

H	SR	V	Part Number		L 0.01mm increments	P	A°	C	U/Price 1～4	
			Type	D					PGES	PGKS
2.5	0.4	1.2	PGES (Standard type)	1.5	6.00～20.00	0.3	2	0 0.2 0.3 0.4 0.5	Quotation	
3		1.3	PGKS (High hardness type)	1.6		0.3 0.4				
	0.5			1.8		0.3 0.4 0.5*				

*C0.4 and C0.5 are not available when P=0.5

Order

Part Number	L	P	A	C
PGKS1.5	15.00	P0.3	A2	C0.2
PGES1.6	10.00	P0.3	A2	C0.4

Days to Ship Quotation

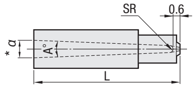
Price Quotation

Alterations

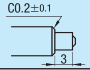
Part Number	L	P	A	C	(CC · PKV · LKC)
PGKS1.5	15.00	P0.3	A2	C0.2	CC
PGES1.6	10.00	P0.3	A2	C0.4	PKV

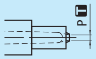
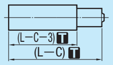
● Calculation for the inlet diameter *α

$$*\alpha = 2SR + 2(L - 0.6 - SR)\tan\frac{A^\circ}{2}$$



The dimension acquired using the above calculation is the theoretical (reference) value.

Alterations	Code	Spec.	1Code
 C0.2±0.1	CC	C chamfering for inlay relief.	Quotation

Alterations	Code	Spec.	
	PKV	Changes P dimension tolerance. P±0.02 ···▸ P±0.01	Quotation
	LKC	Changes the tolerances of the dimensions below. (L−C−3) $^{0}_{-0.05}$ ···▸ $^{0}_{-0.02}$ (L−C) $^{+0.05}_{0}$ ···▸ $^{+0.02}_{0}$	

Electroforming

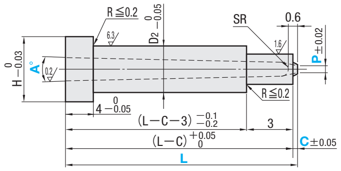
PIN-POINT GATE BUSHINGS WITH HEAD INNER DIAMETER SR

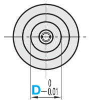
—SMALL DIAMETER TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

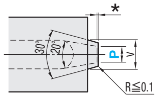
Part Number	Type	M	H
PGEST	Standard	Nickel alloy	(Inside) 55～60HRC depth: 0.5 (Outside) 40～45HRC
PGKST	High hardness		58～62HRC (The inner and outer surface have the same hardness)





Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

Enlarged view of the tip



*This bushing has a flat area of 0～0.1 on its tip (P dimension).

H	D2	SR	V	Part Number		L 0.01mm increments	P	A°	C	U/Price 1～4	
				Type	D					PGEST	PGKST
5	2.5	0.4	1.2	PGEST (Standard type)	1.5	10.00～20.00	0.3	2	0 0.2 0.3 0.4 0.5	Quotation	
6	3		1.3	PGKST (High hardness type)	1.6		0.3 0.4				
		0.5			1.8		0.3 0.4 0.5*				

*C0.4 and C0.5 are not available when P=0.5

Order

Part Number	L	P	A	C
PGKST1.5	15.00	P0.3	A2	C0.2
PGEST1.8	12.00	P0.4	A2	C0.4

Days to Ship Quotation

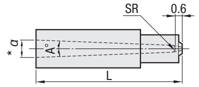
Price Quotation

Alterations

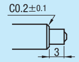
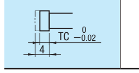
Part Number	L	P	A	C	(CC · TC · PKV · LKC)
PGEST1.5	15.00	P0.3	A2	C0.2	CC
PGKST1.8	12.00	P0.4	A2	C0.4	LKC

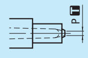
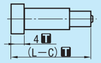
● Calculation for the inlet diameter *α

$$*\alpha = 2SR + 2(L - 0.6 - SR)\tan\frac{A^\circ}{2}$$



The dimension acquired using the above calculation is the theoretical (reference) value.

Alterations	Code	Spec.	1Code
 C0.2±0.1	CC	C chamfering for inlay relief.	Quotation
	TC	TC=0.1mm increments 2.0≦TC<4 L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	

Alterations	Code	Spec.	1Code
	PKV	Changes P dimension tolerance. P±0.02 ···▸ P±0.01	Quotation
	LKC	Changes the tolerances of the dimensions below. 4 $^{0}_{-0.05}$ ···▸ $^{0}_{-0.02}$ (L−C) $^{+0.05}_{0}$ ···▸ $^{+0.02}_{0}$ The tolerance of L−C−3 remains $^{-0.1}_{-0.2}$ unchanged.	

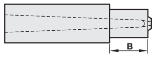
Carbide

PIN-POINT GATE BUSHINGS INNER DIAMETER SR

—B DIMENSION SELECTION TYPE—

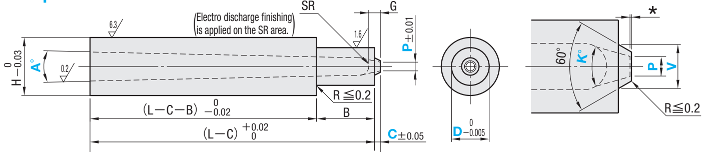
Carbide

Inner diameter SR B dimension selection type



RoHS

Shape 1A

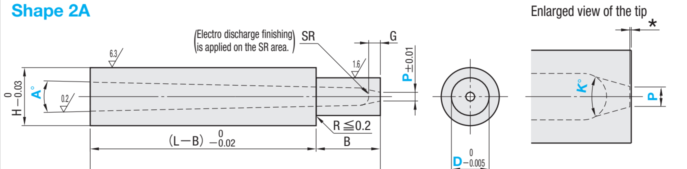

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
C±0.05
L
D 0 −0.005
60°
K°
P
V
R≦0.2
*

Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 2A

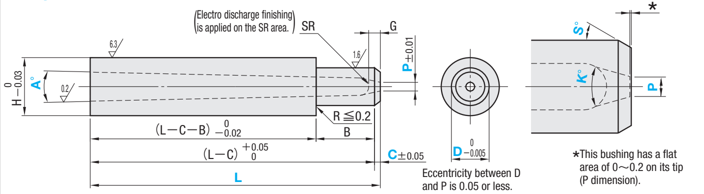

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−B) 0 −0.02
B
L +0.02 0
D 0 −0.005
K°
P
*

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 3A

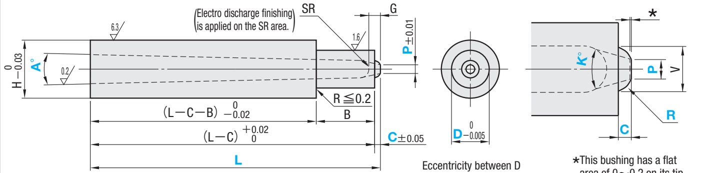

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.005
S°
K°
P
*

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

Shape 4A


Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
C±0.05
L
D 0 −0.005
K°
P
V
R
C
*

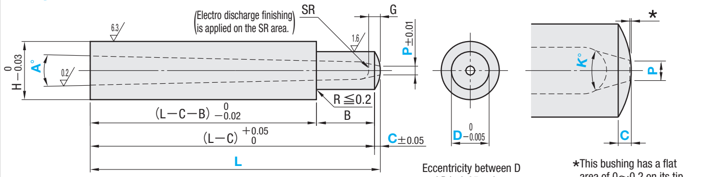
$R \geqq \sqrt{(P/2)^2 + C^2}$ $V = 2 \times \sqrt{R^2 - (\sqrt{R^2 - (P/2)^2} - C)^2}$

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

RoHS

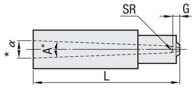
Shape 5A

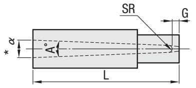

Enlarged view of the tip
(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
H 0 −0.03
A°
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
C±0.05
L
D 0 −0.005
K°
P
C
*

Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

- **Calculation for the inlet diameter** $*\alpha$ $*\alpha = 2SR + 2(L-G-SR)\tan\frac{A^\circ}{2}$





The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGWB□A	V40 (Carbide Alloy)	87~88HRA (Converted score to Vickers hardness : 960HV)

Non JIS material definition is listed on P.1351 - 1352

H	G	B	SR	Part Number Type	Part Number Shape	Part Number D	L 0.01mm increments	P	A°	K°	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
3	0.7	3	0.60	PGWB (Carbide Alloy V40)	1A	2	6.00~20.00	0.3 0.4 0.5(*1)	1	20	0.2~0.4	1.3~1.9	1~45	0.4~0.8
4	1.0	4	0.75			2.5	8.00~25.00	0.3 0.4 0.5 0.6(*1)			0.2~0.5	1.5~2.4		0.6~1.0
5	1.2	6	1.00		2A	3	10.00~40.00	0.5 0.6 0.7 0.8			0.3~0.8	2.0~2.9		0.8~1.5
6			1.00 1.25		3A	4		0.6 0.7 0.8 0.9 1.0	2			2.5~3.9		
8	1.5	10	1.25 1.50		4A	5	15.00~40.00	0.8 0.9 1.0 1.2	3	30	0.5~1.5	3.5~4.9		1.0~2.0
9			1.25 1.50		5A	6		1.0 1.2 1.3 1.4 1.5(*2)				4.0~5.9	1~50	1.5~3.0
11			1.50 2.00			8		1.2 1.3 1.4 1.5 1.6				4.5~7.9	1~60	2.0~4.0

For shape 4A, $R \geqq \sqrt{(P/2)^2 + C^2}$

(*1) For P0.5(D2) and P0.6(D2.5), only K20° can be selected.
(*2) When P1.5(D6) and K30°, G is 1.2.

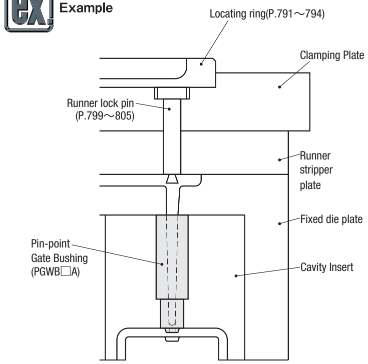
Order

Part Number	—	L	—	P	—	A	—	K	—	C V S R
PGWB1A4	—	20.01	—	P0.8	—	A2	—	K30	—	C0.5—V3.0
PGWB2A4	—	20.01	—	P0.8	—	A2	—	K30		
PGWB3A4	—	20.01	—	P0.8	—	A2	—	K30	—	C0.5—S30
PGWB4A4	—	20.01	—	P0.8	—	A2	—	K30	—	C0.5—R1.0
PGWB5A4	—	20.01	—	P0.8	—	A2	—	K30	—	C0.5

Days to Ship Quotation

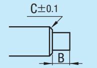
Price Quotation

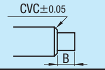
Example


Locating ring(P.791~794)
Clamping Plate
Runner lock pin (P.799~805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGWB□A)
Cavity Insert

Alterations

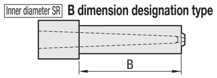
Part Number	—	L	—	P	—	A	—	K	—	C V S R	—	(CC · CVC)
PGWB1A4	—	20.01	—	P0.8	—	A2	—	K20	—	C0.5—V3.0	—	CVC0.3

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D2・2.5 → C0.2 D3・4 → C0.3 D5~8 → C0.5	Quotation

Alterations	Code	Spec.	1Code
	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(H-D)}{2} - 0.1$	Quotation

PIN-POINT GATE BUSHINGS INNER DIAMETER SR

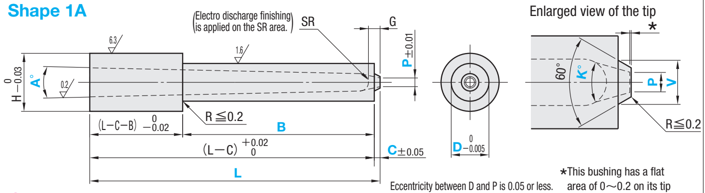
—B DIMENSION DESIGNATION TYPE—


Inner diameter SR
B dimension designation type
B

Non JIS material definition is listed on P.1351 - 1352

RoHS

Shape 1A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
A°
H 0 −0.03
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
L
C±0.05
D 0 −0.005
Enlarged view of the tip
*
60°
K°
P
V
R≦0.2

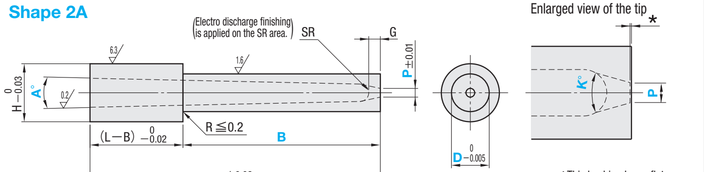
Eccentricity between D and P is 0.05 or less.
Eccentricity between D and V is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0

RoHS

Shape 2A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
A°
H 0 −0.03
P±0.01
R≦0.2
(L−B) 0 −0.02
B
L +0.02 0
D 0 −0.005
Enlarged view of the tip
*
K°
P

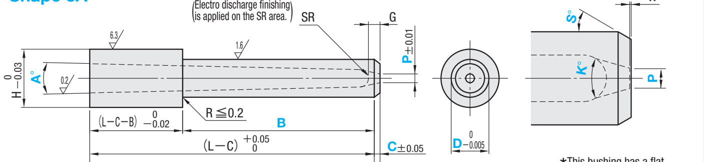
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−B)≧3.0

RoHS

Shape 3A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
A°
H 0 −0.03
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
L
C±0.05
D 0 −0.005
Enlarged view of the tip
*
S°
K°
P

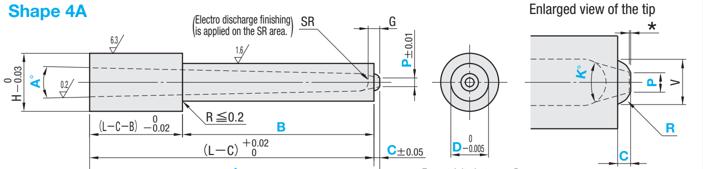
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0

RoHS

Shape 4A


(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
A°
H 0 −0.03
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.02 0
L
C±0.05
D 0 −0.005
Enlarged view of the tip
*
K°
P
V
R
C

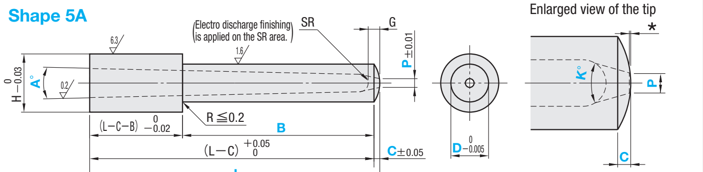
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0　$R \geqq \sqrt{(P/2)^2+C^2}$　$V=2\times\sqrt{R^2-(\sqrt{R^2-(P/2)^2}-C)^2}$

RoHS

Shape 5A

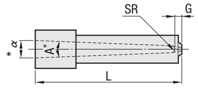

(Electro discharge finishing is applied on the SR area.)
SR
G
6.3
1.6
0.2
A°
H 0 −0.03
P±0.01
R≦0.2
(L−C−B) 0 −0.02
B
(L−C) +0.05 0
L
C±0.05
D 0 −0.005
Enlarged view of the tip
*
K°
P
C

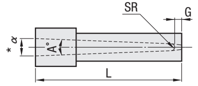
Eccentricity between D and P is 0.05 or less.

*This bushing has a flat area of 0~0.2 on its tip (P dimension).

(L−C−B)≧3.0

- **Calculation for the inlet diameter** $*\alpha$　$*\alpha=2SR+2(L-G-SR)\tan\frac{A^\circ}{2}$





The dimension acquired using the above calculation is the theoretical (reference) value.

Part Number	M	H
PGW□A	V40 (Carbide Alloy)	87~88HRA (Converted score to Vickers hardness : 960HV)

H	G	SR	Part Number Type	Part Number Shape	D	L 0.01mm increments	P	A°	K°	B 0.01mm increments	None for 2A C 0.1mm increments	Shape 1A only V 0.1mm increments	Shape 3A only S° 1° increments	Shape 4A only R 0.1mm increments
3	0.7	0.60	PGW (Carbide Alloy V40)	1A 2A 3A 4A 5A	2	6.00~20.00	0.3 0.4 0.5(*1)	1	20 30	3.00~ 5.00	0.2~0.4	1.3~1.9	1~45	0.4~0.8
								2						
								3						
4	1.0	0.75			2.5	8.00~25.00	0.3 0.4 0.5 0.6(*1)	1		4.00~ 6.00	0.2~0.5	1.5~2.4		0.6~1.0
								2						
								3						
5	1.2	1.00			3	10.00~40.00	0.5 0.6 0.7 0.8	1		5.00~ 9.00	0.3~0.8	2.0~2.9		0.8~1.5
								2		5.00~ 8.00				
								3		5.00~ 7.00				
6		1.00			4		0.6 0.7	1		5.00~30.00		2.5~3.9		
								2						
								3		5.00~20.00				
		1.25					0.8 0.9 1.0	1		5.00~30.00				
								2						
								3		5.00~20.00				
8	1.5	1.25			5	15.00~40.00	0.8 0.9 1.0	1		5.00~35.00	0.5~1.5	3.5~4.9		1.0~2.0
								2		5.00~30.00				
								3						
		1.50					1.2	1		5.00~30.00				
								2						
								3		5.00~20.00				
9		1.25			6		1.0	1		5.00~30.00		4.0~5.9	1~50	1.5~3.0
								2						
								3		5.00~20.00				
		1.50					1.2 1.3 1.4 1.5(*2)	1		5.00~30.00				
								2						
								3		5.00~20.00				
11		1.50			8		1.2 1.3 1.4	1		5.00~30.00		4.5~7.9	1~60	2.0~4.0
								2						
								3						
		2.00					1.5 1.6	1						
								2						
								3						

For shape 4A, $R \geqq \sqrt{(P/2)^2+C^2}$

(*1) For P0.5(D2) and P0.6(D2.5), only K20° can be selected.
(*2) When P1.5(D6) and K30°, G is 1.2.

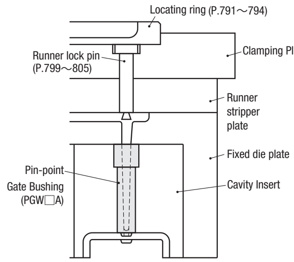
Order

Part Number — L — P — A — K — B — C V S R
PGW1A4 — 20.01 — P0.8 — A2 — K30 — B15.00 — C0.5—V3.0
PGW2A4 — 20.01 — P0.8 — A2 — K30 — B15.00
PGW3A4 — 20.01 — P0.8 — A2 — K30 — B15.00 — C0.5—S30
PGW4A4 — 20.01 — P0.8 — A2 — K30 — B15.00 — C0.5—R1.0
PGW5A4 — 20.01 — P0.8 — A2 — K30 — B15.00 — C0.5

Days to Ship Quotation

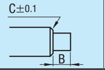
Price Quotation

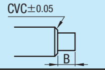
Example


Locating ring (P.791~794)
Clamping Plate
Runner lock pin (P.799~805)
Runner stripper plate
Fixed die plate
Pin-point Gate Bushing (PGW□A)
Cavity Insert

Alterations

Part Number — L — P — A — K — B — C V S R — (CC · CVC)
PGW1A4 — 20.01 — P0.8 — A2 — K20 — B15.00 — C0.5—V3.0 — CVC0.3

Alterations	Code	Spec.	1Code
	CC	C chamfering for inlay relief. D2 · 2.5 → C0.2 D3 · 4 → C0.3 D5~8 → C0.5	Quotation

Alterations	Code	Spec.	1Code
	CVC	C chamfering for inlay relief. CVC=0.1mm increments $0.2 \leqq CVC < \frac{(H-D)}{2} - 0.1$	Quotation

PIN GATE EXTENSION BUSHINGS

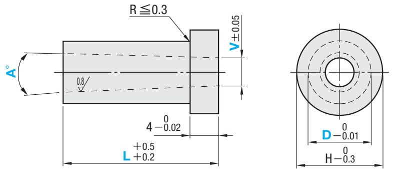
Non JIS material definition is listed on P.1351 - 1352

RoHS

■Head type

Part Number	M	H
PGEH	SKH51	58~60HRC
PGEN	NAK80	37~43HRC

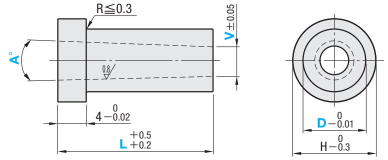
Eccentricity between D and V is 0.05 or less.



■Head type · Reverse tapered type

Part Number	M	H
PGEHR	SKH51	58~60HRC
PGENR	NAK80	37~43HRC

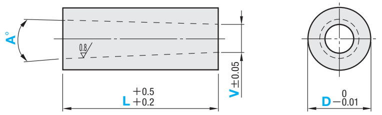
Eccentricity between D and V is 0.05 or less.



■Headless type

Part Number	M	H
PGEHS	SKH51	58~60HRC
PGENS	NAK80	37~43HRC

Eccentricity between D and V is 0.05 or less.



H	Part Number Type	D	L 0.1mm increments	V	A° Angled	U/Price 1~4 pcs.
9	—Head type— PGEH(SKH51) PGEN(NAK80) —Head type·Reverse tapered type— PGEHR(SKH51) PGENR(NAK80) —Headless type— PGEHS(SKH51) PGENS(NAK80)	6	10.0~30.0 30.1~40.0	1.5 2.0 2.5	1 2	Quotation
11		8	10.0~30.0 30.1~40.0	2.0 2.5 3.0 3.5	1 2 3	
15		10	10.0~30.0 30.1~40.0	3.0 3.5 4.0 4.5 5.0		
18		13	10.0~30.0 30.1~40.0	4.5 5.0 5.5 6.0 6.5 7.0		

To use this bushing together with a pin-point gate bushing, select the appropriate dimension referring to"How to Select V Dimension"on the next page.

Order

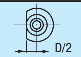
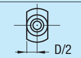
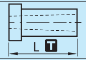
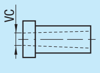
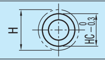
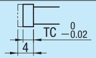
Part Number	—	L	—	V	—	A
PGEH 8	—	30.0	—	V2.5	—	A2
PGEHR8	—	30.0	—	V2.5	—	A2
PGEHS8	—	30.0	—	V2.5	—	A2

Days to Ship Quotation

Price Quotation

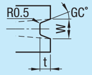
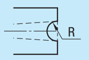
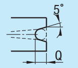
Alterations

Part Number — L — V(VC) — A — (AIW · AHW···etc.)
PGEH10 — 28.34 — VC2.5 — A3 — AIW5 — GC7 — LKC

Alterations	Code	Spec.	1Code
 D/2	KC	Adds a single key flat on the head. Available for head type ⊗ L<16 not available	
 D/2	WKC	Adds two parallel key flats on the head. Available for head type ⊗ L<16 not available	
 L T	LKC	Changes the L dimension tolerance $L^{+0.5}_{+0.2} \cdots\rightarrow L^{+0.05}_{0}$ ⊗ L<16 not available When LKC is used, L dimension alteration in 0.01mm increments possible	Quotation
 VC	VC	Changes V dimension. VC=0.1mm increments	
 H HC −0.3/0	HC	Head diameter change Available for head type D≦HC<H 0.1mm increments	
 TC −0.02/0 4	TC	Head diameter change Available for head type 2.0≦TC<4 0.1mm increments L dimension remains unchanged even when TC is used. 4−TC≦Lmax.−L	

D	L	VCmin.	VCmax.
6	10.0~25.0	1.5	3.5
	25.1~30.0		3.0
8	10.0~25.0		5.0
	25.1~30.0		4.5

D	L	VCmin.	VCmax.
10	10.0~25.0	1.5	7.0
	25.1~30.0		6.5
13	10.0~30.0		7.0

Alterations	Code		Spec.	1Code
Shape A (Trapezoid)  R0.5 GC° W t	*AIW		Available only for PGEH · PGEN AIW10—GC7 Key flat position when KC · WKC is combined. W≦(β−0.4), L≧20	Quotation
	*AHW			
Shape B (Semicircle)  R	BIR		Available only for PGEH · PGEN BIR4 Key flat position when KC · WKC is combined. R≦(β−0.4)/2, L≧20	
	BHR			
Shape C (Arc+Tangent)  5° Q	CIQ		Available only for PGEH · PGEN CIQ6 Key flat position when KC · WKC is combined. Q≦(β−0.4)/1.09, L≧20	
	CHQ			

W dimension GC° choices

W	t	GC°
4	3	7°
5	3.5	
6	4	
8	5.5	10°
10	7	

R dimension choices

R
2
2.25
2.5
3
3.5
4

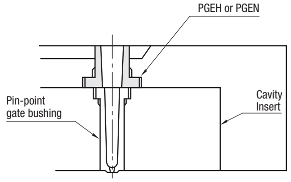
Q dimension choices

Q
4
5
6
8

*Previously the trapezoidal taper angle was fixed at 10°, but now it is possible to select a taper angle of either 10° or 7°.
When you wish to use a taper angle of 7°, " specify (Code)(W dimension)—GC7. " If you do not specify the taper angle, an angle of 10° will be automatically selected.

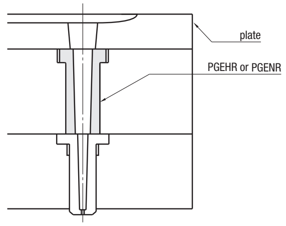
Example

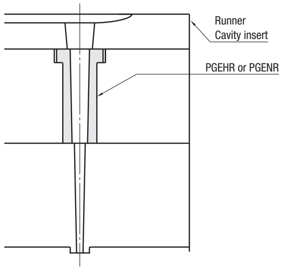
■PGEH · PGEN



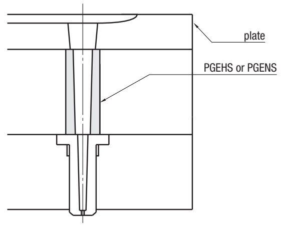
■PGEHR · PGENR

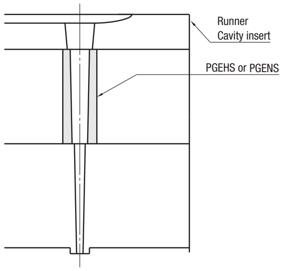
- Extension method for pin-point gate bushings
- Extension method for cavity inserts



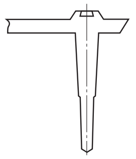


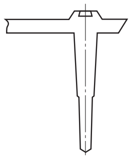
■PGEHS · PGENS

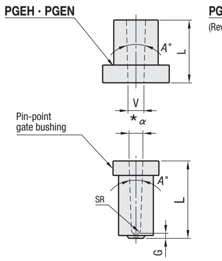


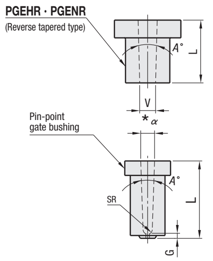


■How to Select V Dimension









$$V \geqq \alpha + x$$

*To use this pin gate extension bushing together with a select the appropriate α dimension from the following formula and designate V dimension.

Calculation for the inlet diameter $*\alpha$ of Pin Gate Extension Bushings

SR the inside diameter

$$*\alpha = 2SR + 2(L-G-SR)\tan\frac{A^\circ}{2}$$

Tapered the inside diameter

$$*\alpha = 2\{(L-G)\tan\frac{A^\circ}{2} + G\tan\frac{K^\circ}{2}\} + P$$

The dimension acquired using the above calculation is the theoretical (reference) value.

●Applicable x dimensions

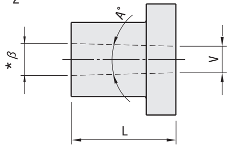
Matching pin point gate bushings				Pin Gate Extension Bushing		X
M	Type	T α	Eccentricity between D and α	T V	Eccentricity between D and V	(Recommended value)
SKH51	PGHS PGH□A PGHST PGHD□A PGHTBL PGHT□A PGHB□A PGHF□A PGHV□A PGHBV□A PGHVT□A	±0.1	0.05 or less	±0.05	0.05 or less	0.3
Carbide	PGWB□A PGW□A					
Electro forming	PGES PGED□A PGEST PGEK□A PGEB□A PGET□A PGE□A PGEBL PGEBV□A PGEV□A	±0.05	0.05 or less			0.3
Electro forming (high hardness)	PGKS PGKD□A PGKST PGKK□A PGKB□A PGKT□A PGK□A PGKBL					

*Please examine at the time of designing the mold that the relationship between V and α will not be undercut when runner is pulled out.

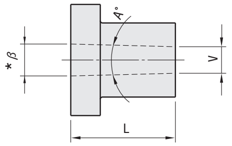
■Calculation for the inlet diameter $*\beta$ of Pin Gate Extension Bushings

$$*\beta = V + 2L\tan\frac{A}{2}$$

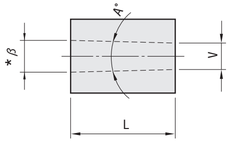
PGEH · PGEN



PGEHR · PGENR



PGEHS · PGENS



GUIDE FOR ROLLING GATE CUT UNITS

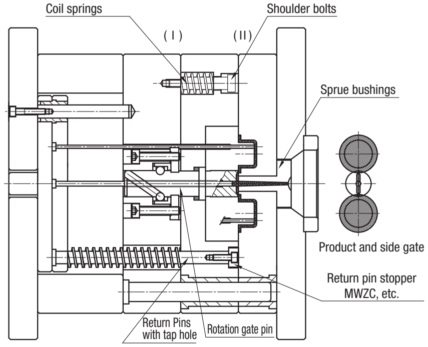
■What is rolling gate cut unit?

This unit is designed to rotate the rotary gate pin to cut the side gate by using the mold opening movement.

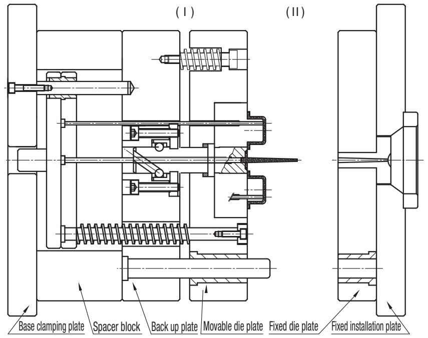
■Characteristics

- Since gate section of the side gate is larger than that of pin gate and oblique gate, it can effectively apply holding pressure. Therefore, traction prevention, dimensional stability and appearance transcription are improved.
- Labor cost can be significantly reduced by automation of gate cut operation.
- Gate cut sections are uniform to avoid unstable hand cutting. In addition, generation of dust during gate cutting can be repressed.

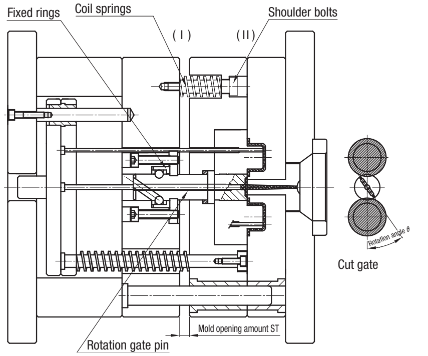
■How to operate rolling gate cut unit


Coil springs
Shoulder bolts
(I)
(II)
Sprue bushings
Product and side gate
Return pin stopper
MWZC, etc.
Return Pins
with tap hole
Rotation gate pin

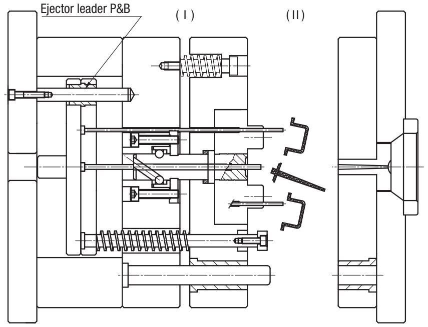
1) In forming
Resin flows through runner and side gate engraved on the rotation gate from sprue to form the product.


(I)
(II)
Base clamping plate
Spacer block
Back up plate
Movable die plate
Fixed die plate
Fixed installation plate

3) Mold opened
Operation of PL surface (I) is limited by the shoulder bolts and the PL surface (II) is opened.


Fixed rings
Coil springs
Shoulder bolts
(I)
(II)
Rotation angle θ
Cut gate
Mold opening amount ST
Rotation gate pin

2) In gate cutting
- The PL surface (I) is opened by opening of the moving side and coil spring.
- By rotating (θ degree) the gate pin with steel ball in the fixed ring and pin's spiral groove using mold opening (ST) of the PL surface (I), it cuts the side gate.


Ejector leader P&B
(I)
(II)

4) When product is ejected
Ejector plate is ejected and the product, runner and sprue are removed.

■Notes

1) This is a unit to cut the gate by rotating gate pins by means of mold opening of (I) before the product PL surface (II). Since this is a special structure, be sure to use the following parts :
- Coil spring・・・・・・・Use coil springs and parting lock to ensure that the PL surface (I) is opened first.
- Shoulder bolt・・・・・・・Used for the product PL surface (II) to open.
- Return pin stopper・・・Interlocks and operates the moving side plate and ejector plate when the PL(I) is opened. Without interlocking, the product and ejector pin tip are separated by the opening amount.
The product may be whitened when the ejector rod contacts with the product again.
- Ejector leader pin・bushing・・・・Necessary to stabilize the rotation gate cut unit operations.

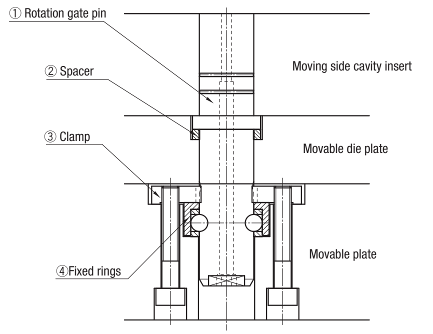
2) Do not use Z pin. Otherwise operation of rotation gate cut pin is interrupted.

ROLLING GATE CUT UNITS

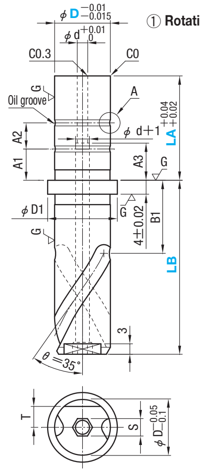
Non JIS material definition is listed on P.1351 - 1352

RoHS

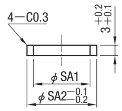
MRGC


① Rotation gate pin
② Spacer
③ Clamp
④Fixed rings
Moving side cavity insert
Movable die plate
Movable plate

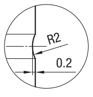
① Rotation gate pin


φ D −0.01 −0.015
φ d +0.01 0
C0.3
C0
Oil groove
G
A
φ d+1
LA +0.04 +0.02
A2
A1
A3
G
φ D1
G
4±0.02
G
B1
LB
3
θ=35°
T
S
φ D −0.05 −0.1

② Spacer

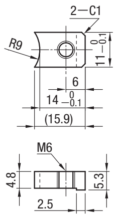

4−C0.3
3 +0.2 +0.1
φ SA1
φ SA2 −0.1 −0.2

Thickness adjustment required for assembly

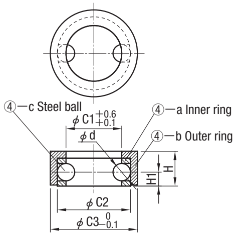


Details of part A

③ Clamp


2−C1
R9
11 0 −0.1
6
14 0 −0.1
(15.9)
M6
4.8
5.3
2.5

④ Fixed rings


④−c Steel ball
④−a Inner ring
④−b Outer ring
φ C1 +0.6 +0.1
φ d
H1
H
φ C2
φ C3 0 −0.1

No.	Name	Material	Hardness
①	Rotation gate pin	High-speed steel	60HRC～
②	Spacer	NAK55	37～43HRC
③	Clamp	S45C+Ni plating	35～40HRC
④	Fixed rings	—	—
	a Inner ring	NAK55	37～43HRC
	b Outer ring	S45C+Ni plating	—
	c Steel ball	SUJ2	61～67HRC

①Rotation gate pin									②Spacer		④Fixed ring (a・b・c)						Part Number		LA	LB	U/Price
D	D1	d	A1	A2	A3	B1	S	T	SA1	SA2	C1	C2	C3	H	H1	d	Type	D			1～4
16	20	3	10	8	10	20	5	6	16.2	20	16	21	25	10	4	5	MRGC	16	40	60	Quotation
20	26	5	15	10	20	25	8	8	20.2	26	20	26	31	13	5.5	6		20	60	80	

Order

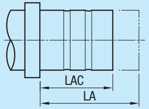
Part Number	—	LA	—	LB
MRGC20	—	40	—	80

Days to Ship Quotation

Alterations

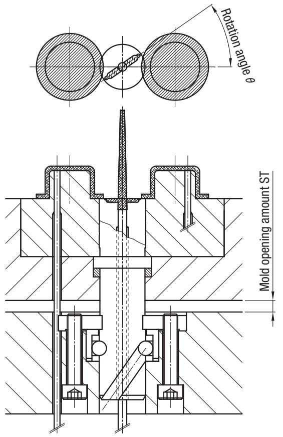
Part Number	—	LAC	—	LB
MRGC20	—	LAC39	—	80

Quotation

Alteration	Code	Spec.	1Code
	LAC	LA dimension alteration D / LA / 0.01mm increments 16 / 40 / 25≦LAC＜40 20 / 40 / 35≦LAC＜40 20 / 60 / 40＜LAC＜60 There is not change to A1, A2, and A3.	Quotation

HOW TO START／MOUNT ROLLING GATE CUT UNIT

■Mold opening amount and gate rotation angle

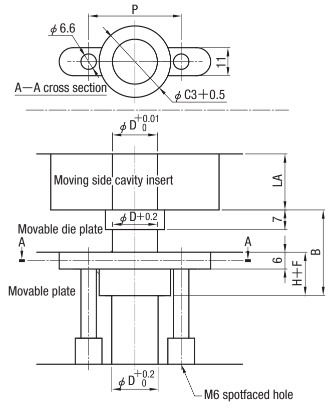

Rotation angle θ
Mold opening amount ST

Mold opening amount ST and rotation angle

Mold opening amount ST	Rotation angle θ	
	D16	D20
1	5.0	4.0
2	10.0	8.0
3	15.1	12.0
4	20.1	16.1
5	25.1	20.1
6	30.1	24.1
7	35.1	28.1
8	40.1	32.1
9	45.2	36.1
10	50.2	40.1
11	55.2	44.2
12	60.2	48.2
13	65.2	52.2
14	70.2	56.2
15	75.3	60.2
16	80.3	64.2
17	85.3	68.2
18	90.3	72.3

Ensure a gap of at least 0.5mm between the gate cut after rotation and the product.

■Installation hole processing example


P
φ6.6
11
A—A cross section
φC3+0.5
φD +0.01 0
Moving side cavity insert
LA
φD+0.2
7
Movable die plate
A
A
6
B
H+F
Movable plate
φD +0.2 0
M6 spotfaced hole

$B \geqq 2+B_1+H_1$

B_1 : Start position from head and groove of the rotation gate pin

H_1 : Length from the bottom of fixed ring to the steel ball

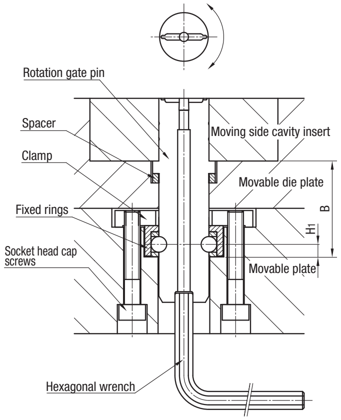
Provide an allowance of 2mm or more in the groove start position of the fixed ring steel ball and rotation gate pin.

D	LA	F	C3	P
16	25〜40	15.5	25	34
20	35〜60	18.5	31	40

■Notes on handling

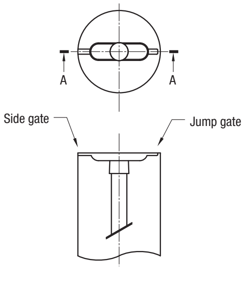
- Examine thoroughly when you select resin that is easily cracked (PMMA, etc.).
- This does not apply for all resin types. Refer to the molding example for selection.

■How to adjust gate position


Rotation gate pin
Spacer
Clamp
Fixed rings
Socket head cap screws
Moving side cavity insert
Movable die plate
B
H₁
Movable plate
Hexagonal wrench

For angle adjustment, insert a hexagonal wrench to the end of the rotation gate pin with the Movable die plate and Movable plate closed, rotate it to adjust the gate position and fix the gate pin with socket head cap screw and clamp.

■Gate shape example

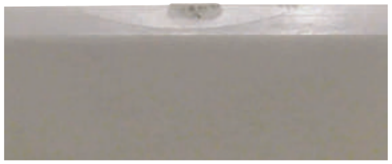

A
A
Side gate
Jump gate

A—A cross section

Examine your own runner・gate shapes in accordance with each resin.

FORMING EXAMPLE OF ROLLING GATE CUT UNIT

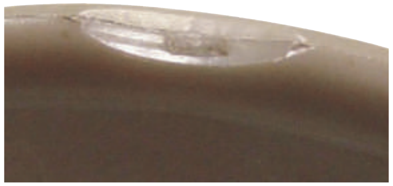
Resin : PC
Gate : Jump



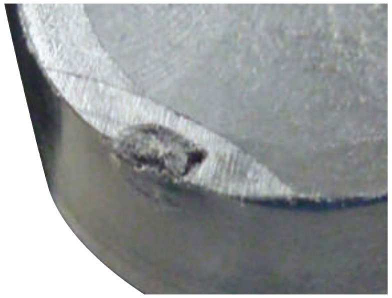
Resin : ABS
Gate : Side

Resin : 66 nylon
Gate : Jump

Resin : PPS＋G30%
Gate : Side



Resin : POM
Gate : Jump



Resin : PBT＋G30%
Gate : Oblique

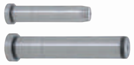
■Resin with proven forming results

・PPS＋G40%　・ABS　・66 nylon　・POM・PMMA　・PC　・PBT

LEADER COMPONENTS

LEADER COMPONENTS

Product Name	Precision Leader Pins — Head · Plain Blank type—	— Head · Plain Press-fit length designation type/press-fit diameter/length designation type—	— Head · Oil groove Blank type—
Part Number	GPH	GPHL GPH—XL	GPJ
Page	881	883	886



— Head · Oil groove Press-fit length designation type/Press-fit diameter · length designation type—	— Head · Helical groove Press-fit length designation type—	Precision leader pins — Head · Helical groove —	Leader Pins with Diameter of Recess — Head · Plain Recess/Press-fit designation type—
GPJL GPJ—XL	GPHLSP	GPHLO□ GPH—XLO□	GPHOT GPHOT—XL
887	889	891	893

Precision Leader Pins — Straight · Plain Press-fit length designation type/press-fit diameter/length designation type—	— Straight · Oil groove Press-fit length designation type—	Leader Pins with Diameter of Recess — Straight · Plain Recess/Press-fit designation type—	Precision leader pins — Staight · Helical grove —
GPSL GPS—XL	GPOL	GPSOT	GPSLO□ GPS—XLO□
895	897	899	901

Leader Pins for Middle · Large Mold	Assist Pins for Leader Pin	Straight Leader Pins for Middle/Large Mold —Bolt type—	—Joint type—	Assist Pins for Leader Pin
GPX GPP	GAP	GPPTA	GPPTB	GAPT
903	904	905	906	906

Support Pins — Plain Press-fit length designation type—	Support Pins —With oil groove · press-fit length designation type—	Support Pin Collars	Precision Leader Bushings —Head type with oil groove—	—Straight type with oil groove—
SPP	SPP—OC	SPS SPD	GBH	GBS
907	908	910	911	912

Leader Bushings —Head type with oil groove—	—Straight type with oil groove—	—Head type with no oil groove—	—Straight type with no oil groove—	Oil-free Leader Bushing —Special solid lubricant embedded type with head—
GBHE	GBSE	GBAM	GBBM	GBHEZ
913	914	915	916	917

—Straight type with special solid lubricant embedded—	—Copper alloy oil-free type with head—	—Copper allay straight oil-free type—	Oil-Free Leader Bushings for High Temperature Use —Special Copper Alloy with Head—	—Special Copper Alloy Straight—
GBSEZ	GBHDZ	GBSDZ	GBHKZ	GBSKZ
918	919	920	921	922

Leader Bushings for Middle/Large Mold —Straight type—	Stopper Plates for Middle/Large Mold	Leader Pins for Rubber Mold	Leader Bushings for Rubber Mold
GBST	GPPH	GMT GMR	GMB
923	923	924	924

■List of Leader Pins

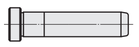
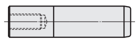
Flange type	Type	Blank		Press-Fit length free designation		Press-Fit diameter · length free designation	
		Part Number	Page	Part Number	Page	Part Number	Page
Head type	Plain	GPH	P.881	GPHL	P.883	GPH — XL	P.883
	Oil groove	GPJ	P.886	GPJL	P.887	GPJ — XL	P.887
	Helical groove	—	—	GPHLSP GPHLOC GPHLOF	P.889 P.891	GPH — XLOC GPH — XLOF	P.891
	Diameter of recess	—	—	GPHOT	P.893	GPHOT — XL	P.893
Straight type	Plain	—	—	GPSL	P.895	GPS — XL	P.895
	Oil groove	—	—	GPOL	P.897	—	—
	Helical groove	—	—	GPSLOC GPSLOF	P.901	GPS — XLOC GPS — XLOF	P.901
	Diameter of recess	—	—	GPSOT	P.899	—	—

■List of Leader Bushings

Flange type	Type	Precision		Standard	
		Part Number	Page	Part Number	Page
Head type	No Oil groove	—	—	GBAM	P.915
	Oil groove	GBH	P.911	GBHE	P.913
	Oil-free SUJ2	—	—	GBHEZ	P.917
	Oil-free Copper alloy	—	—	GBHDZ	P.919
	Oil-free Special Copper Alloy	—	—	GBHKZ	P.921
Straight type	No Oil groove	—	—	GBBM	P.916
	Oil groove	GBS	P.912	GBSE	P.914
	Oil-free SUJ2	—	—	GBSEZ	P.918
	Oil-free Copper alloy	—	—	GBSDZ	P.920
	Oil-free Special Copper Alloy	—	—	GBSKZ	P.922

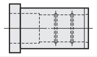
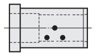
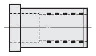
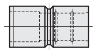
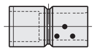
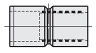
GUIDE FOR LEADER COMPONENTS

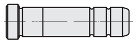
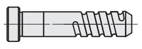
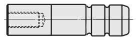
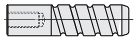
■List of Leader Pins and Leader Bushings・Combination Table

Leader Pins				
Plain with head		GPH	L dimension selection	P.881
		GPHL	Press-fit length designation	P.883
		GPH−XL	Press-fit diameter/ length designation	
Straight Plain		GPSL	Press-fit length designation	P.895
		GPS−XL	Press-fit diameter/ length designation	

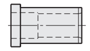
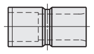
Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision leader pins with precision leader bushings.

Suitable

Leader Bushings				
Head type		GBH	Precision with oil groove	P.911
		GBHE	Oil groove	P.913
		GBHDZ	Oil-free Copper alloy type	P.919
		GBHKZ	Oil-free special Copper alloy	P.921
		GBHEZ	Oil-free SUJ2	P.917
Straight		GBS	Precision with oil groove	P.912
		GBSE	Oil groove	P.914
		GBSDZ	Oil-free Copper alloy type	P.920
		GBSKZ	Oil-free special Copper alloy	P.922
		GBSEZ	Oil-free SUJ2	P.918

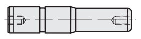
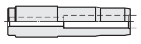
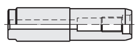
Leader Pins				
Head type with oil groove		GPJ	L dimension selection	P.886
		GPJL	Press-fit length designation	P.887
		GPJ−XL	Press-fit diameter/ length designation	
Head type spiral groove		GPHLSP	Press-fit length designation	P.889
		GPHLOC	Press-fit length designation	P.891
		GPHLOF		
		GPH−XLOC	Press-fit diameter/ length designation	
		GPH−XLOF		
Straight with oil groove		GPOL	Press-fit length designation	P.897
Straight spiral groove		GPSLOC	Press-fit length designation	P.901
		GPSLOF		
		GPS−XLOC	Press-fit diameter/ length designation	
		GPS−XLOF		

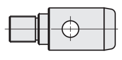
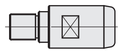
Suitable

Leader Bushings				
Head type		GBAM	No oil groove	P.915
Straight		GBBM	No oil groove	P.916

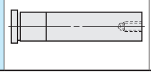
Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision leader pins with precision leader bushings.

■List of Leader Pins, Leader Assist Pins for Large Mold

Leader Pins for Large Mold				
Straight joint type		GPX	Joint type	P.903
		GPP		
Straight bolt fixing type		GPPTA	L dimension designation	P.905
Straight bolt fixing joint type		GPPTB	Joint type	P.906

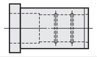
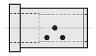
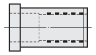
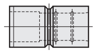
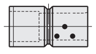
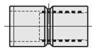
Assist Pins for Large Mold				
Round hole type		GAP	Applicable leader pins GPX, GPP (GPHL GPJL GPSL Applicable to D40∼60)	P.904
Wrenching type		GAPT	Applicable leader pins GPPTB	P.906

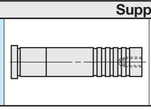
■List of Support Pins and Leader Bushings・Combination Table

Support Pins				
Plain		SPP	Press-fit length designation	P.907

Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision support pins with precision leader bushings.

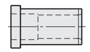
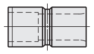
Suitable

Leader Bushings				
Head type		GBH	Precision with oil groove	P.911
		GBHE	Oil groove	P.913
		GBHDZ	Oil-free Copper alloy type	P.919
		GBHKZ	Oil-free special Copper alloy	P.921
		GBHEZ	Oil-free SUJ2	P.917
Straight		GBS	Precision with oil groove	P.912
		GBSE	Oil groove	P.914
		GBSDZ	Oil-free Copper alloy type	P.920
		GBSKZ	Oil-free special Copper alloy	P.922
		GBSEZ	Oil-free SUJ2	P.918

Support Pins				
Oil groove		SPP−OC	Press-fit length designation	P.908

Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision support pins with precision leader bushings.

Suitable

Leader Bushings				
Head type		GBAM	No oil groove	P.915
Straight		GBBM	No oil groove	P.916

Non JIS material definition is listed on P.1351 - 1352

■Clearance Range of Combination with Leader Pins and Leader Bushings

Precision Leader Pins GPH GPHL GPH−XL GPSL GPS−XL GPHLOC GPH−XLOC GPHLOF GPH−XLOF		Leader Bushings GBHE GBSE Oil-free type	Clearance Range	Precision Leader Bushings GBH GBS	Clearance Range
Sliding parts					
Dia.	Tolerance	Inner Dia. tolerance		Inner Dia. tolerance	
8	−0.015 −0.020	+0.014 +0.005	0.020∼0.034	0 −0.005	0.010∼0.020
10					
12	−0.020 −0.025	+0.017 +0.006	0.026∼0.042	−0.005 −0.010	
13					
16					
20	−0.025 −0.030	+0.020 +0.007	0.032∼0.050	−0.010 −0.015	
25					
28					
30					
32	−0.030 −0.035	+0.025 +0.009	0.039∼0.060	—	—
35					
40	−0.030 −0.040		0.039∼0.065		
50					
60	−0.030 −0.050	+0.029 +0.010	0.040∼0.079		

Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision leader pins with precision leader bushings.

Precision Leader Pins GPJ GPJL GPJ−XL GPHLSP GPOL GPSLOC GPS−XLOC GPSLOF GPS−XLOF		Leader Bushings GBAM GBBM	Clearance Range
Sliding parts			
Dia.	Tolerance	Inner Dia. tolerance	
8	−0.015 −0.020	+0.014 +0.005	0.020∼0.034
10			
12	−0.020 −0.025	+0.017 +0.006	0.026∼0.042
13			
16			
20	−0.025 −0.030	+0.020 +0.007	0.032∼0.050
25			
28			
30			
32	−0.030 −0.040	+0.025 +0.009	0.039∼0.065
35			
40			
50			
60	−0.030 −0.050	+0.029 +0.010	0.040∼0.079

Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision leader pins with precision leader bushings.

■Clearance Range of Combination with Support Pins and Leader Bushings

Support Pins SPP		Leader Bushings GBHE GBSE Oil-free type	Clearance Range	Precision Leader Bushings GBH GBS	Clearance Range
Sliding parts					
Dia.	Tolerance	Inner Dia. tolerance		Inner Dia. tolerance	
13	−0.016 −0.027	+0.017 +0.006	0.022∼0.044	−0.005 −0.010	0.006∼0.022
16					
20	−0.020 −0.033	+0.020 +0.007	0.027∼0.053	−0.010 −0.015	0.005∼0.023
25					
28					
30					
32	−0.025 −0.041	+0.025 +0.009	0.034∼0.066	—	—
35					
36					
40					

Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision leader pins with precision leader bushings.

Support Pins SPP−OC		Leader Bushings GBAM GBBM	Clearance Range
Sliding parts			
Dia.	Tolerance	Inner Dia. tolerance	
13	−0.016 −0.027	+0.017 +0.006	0.022∼0.044
16			
20	−0.020 −0.033	+0.020 +0.007	0.027∼0.053
25			
28			
30			
32	−0.025 −0.041	+0.025 +0.009	0.034∼0.066
35			
36			
40			

Please be careful of the length of pin, sliding amount, mold temperature and etc. when combining precision leader pins with precision leader bushings.

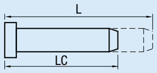
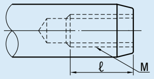
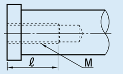
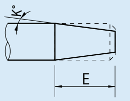
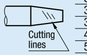
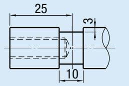
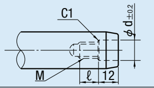
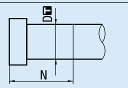
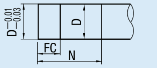
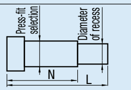
ALTERATION GUIDE FOR LEADER PINS

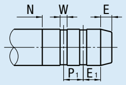
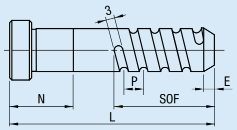
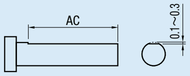
■List of Alterations and Applicable Products

○: Alteration available ⊗ Combination of GC with OC and SOF not available.

Alterations	Code	GPH	GPHL GPH−XL	GPJ	GPJL GPJ−XL	GPHLSP	GPHLO□ GPH−XLO□	GPHOT GPHOT−XL	GPSL GPS−XL	GPOL	GPSOT	GPSLO□ GPS−XLO□	GPX GPP	GPPTA GPPTB
		P.881	P.883	P.886	P.887	P.889	P.891	P.893	P.895	P.897	P.899	P.901	P.903	P.905・906
Full length alteration	LC	—	○	—	—	—	○	○	○	—	○	○	—	—
Tip tapping	MC	—	○	—	○	○	○	○	○	○	○	○	—	—
Tapping on the head	MMC	—	○	—	○	○	○	○	—	—	—	○	—	—
Tip tapering	GC	—	○	—	—	—	—	○	○	—	○	—	—	—
Stopper groove processing	YC	—	—	—	—	—	—	—	○	—	—	○	○	—
Leader assist pin	GA	—	○ (D40～60)	—	○ (D40～60)	○ (40・50)	—	—	○ (D40～60)	○ (D40～60)	—	—	○	—
Press-fit section tolerance alteration	DKC	—	○(GPHL Only)	—	○(GPJL Only)	○	○	○	○(GPSL Only)	○	○	○	—	—
Introduction recess processing	FC	—	—	—	—	—	—	—	○	○	—	○	—	—
Elimination of sliding part	BN	—	—	—	—	—	—	○	—	—	○	—	—	—
Oil groove processing	OC	—	○	—	—	—	—	○	○	—	○	—	—	—
Groove processing for air relief	AC	—	○	—	—	—	—	—	○	—	—	—	—	—
Spiral groove processing (Free designation)	SOF	Available for Only Support Pins (P.907)												

■Alteration Details

<table>
<tr><th colspan="2">Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td>Full length alteration</td><td> </td><td>LC</td><td>Total length alteration LC＝1mm increments
Shortens the full length (L) as shown in the drawing.
Lmin.＜LC＜Lmax.
(Tip dimension E remains unchanged.)</td><td></td></tr>
<tr><td>Tip tapping</td><td> </td><td>MC</td><td><table><tr><th>D</th><th>M×Pitch</th><th>ℓ</th></tr><tr><td>12・13</td><td>M 6×1.0</td><td>12</td></tr><tr><td>16</td><td>M10×1.5</td><td>20</td></tr><tr><td>20</td><td>M12×1.75</td><td>24</td></tr><tr><td>25～60</td><td>M16×2.0</td><td>32</td></tr></table>Available when D≧12.
Refer to the example.
P.880</td><td></td></tr>
<tr><td>Tapping on the head</td><td> </td><td>MMC</td><td><table><tr><th>D</th><th>M×Pitch</th><th>ℓ</th></tr><tr><td>12～20</td><td>M5× 0.8</td><td>10</td></tr><tr><td>25～60</td><td>M8× 1.25</td><td>16</td></tr></table>Available when D≧12.</td><td></td></tr>
<tr><td>Tip tapering</td><td> </td><td>GC</td><td>Tapers the tip as shown in the drawing.
E＝1mm increments
E＞20 of D16～30 is available only when L≧50.
K＝1° increments 1°≦K≦10°
Designation method GC−E20−K10
⊗ Combination with OC・SOF not available.
When combining with MC
D12～20 D/2−E×tanK°−M/2≧2
D25～60 D/2−E×tanK°−M/2≧3
Depending upon the combination of the D dimension and the E dimension, cutting lines sometimes appear on the tapered part of the tip.

(This is related to the depth of the high frequency hardened surface layer.)
Range of dimension L (1mm increments)<table><tr><th>D</th><th>E</th></tr><tr><td>8</td><td>5≦E≦15</td></tr><tr><td>10</td><td></td></tr><tr><td>12</td><td>5≦E≦20</td></tr><tr><td>13</td><td></td></tr><tr><td>16</td><td>5≦E≦25</td></tr><tr><td>20</td><td>5≦E≦30</td></tr><tr><td>25</td><td>5≦E≦35</td></tr><tr><td>28</td><td></td></tr><tr><td>30</td><td>5≦E≦40</td></tr><tr><td>32</td><td>5≦E≦20</td></tr><tr><td>35</td><td></td></tr><tr><td>40</td><td></td></tr><tr><td>50</td><td></td></tr><tr><td>60</td><td></td></tr></table></td><td>Quotation</td></tr>
<tr><td>Stopper groove processing</td><td> </td><td>YC</td><td>Adds a stopper groove.
Use this alteration when a tap cannot be used.
Refer to the example. P.880</td><td></td></tr>
<tr><td>Leader assist pin alteration</td><td> </td><td>GA</td><td>Adds a tap to attach a leader assist pin
(GAP P.904).
※M: Coarse thread<table><tr><th>D</th><th>M</th><th>ℓ</th><th>φd</th></tr><tr><td>40</td><td>24</td><td>30</td><td>29</td></tr><tr><td>50</td><td>30</td><td>35</td><td>36</td></tr><tr><td>60</td><td></td><td></td><td></td></tr><tr><td>80</td><td>36</td><td>45</td><td>41</td></tr></table></td><td></td></tr>
<tr><td>Press-fit section tolerance alteration</td><td> </td><td>DKC</td><td>Changes the press-fit section's tolerance.
Dm5 ···› $D^{+0.005}_{0}$</td><td></td></tr>
<tr><td>Introduction recess processing</td><td> </td><td>FC</td><td>Adds a introduction recess processing on the press-fit section.
FC＝1mm increments 3≦FC≦N−10
Recess processing section $D^{-0.01}_{-0.03}$</td><td></td></tr>
<tr><td>Elimination of sliding part</td><td> </td><td>BN</td><td>The sliding part is eliminated, so the only specifications are the diameters of the press-fit part and the recess.
BN is indicated as the B dimension.</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td>Oil groove processing</td><td> <table><tr><th>D</th><th>W</th></tr><tr><td>8・10</td><td>2</td></tr><tr><td>12～60</td><td>3</td></tr></table></td><td>OC</td><td>The number of grooves n and E1/P1 dimensions are listed in the tables below.
$N\max.=L-\{E+E_1+(n-1)P_1+\frac{3}{2}W\}$
When GPHOT・GPHOT−XL (P.893)
$(N+B)\max.=L-\{E+E_1+(n-1)P_1+\frac{3}{2}W\}$</td><td></td></tr>
<tr><td>Spiral groove (Designation)</td><td> </td><td>SOF</td><td>Available to specify the range of spiral groove alteration.
SOF＝1mm increments
L−N≧SOF<table><tr><th>L</th><th>P</th><th>SOF</th></tr><tr><td>60～ 70</td><td>10</td><td>When $L-N>\frac{L}{2}$, $SOF=\frac{L}{2}$
When $L-N\leqq\frac{L}{2}$, $SOF=L-(N+10)$</td></tr><tr><td>75～120</td><td>15</td><td></td></tr><tr><td>125～180</td><td>20</td><td></td></tr><tr><td>185～300</td><td>25</td><td></td></tr><tr><td>305～350</td><td>30</td><td></td></tr></table>Designation method SOF50</td><td>Quotation</td></tr>
<tr><td>Groove processing for air relief</td><td> </td><td>AC</td><td>Available to specify the range of groove processing for air relief.
AC＝1mm increments 10≦AC≦L−(N+5)
Designation method AC124</td><td></td></tr>
</table>

● Oil groove dimensions (OC details)

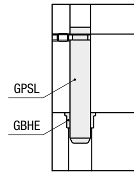
Part Number Type	D	L	E	E1	P1	No.of grooves (n)
GPHL GPH−XL GPSL GPS−XL GPHOT GPHOT−XL GPSOT	8	30～ 45	3	6	0	1
		50～ 65			6	2
		70				3
	10	30～ 45	4	6	0	1
		50～ 65			6	2
		70				3
	12	30～ 40	5	9	0	1
		45～ 50		10	9	2
		55～ 80				3
		85～120		11	10	
		125～160		12	11	
		165～200		13	12	
	13	30～ 40	5	9	0	1
		45～ 50		10	9	2
		55～ 80				3
		85～120		11	10	
		125～160		12	11	
		165～200		13	12	
	16	30～ 40	5	9	0	1
		45～ 50		10	9	2
		55～ 80				3
		85～120		11	10	
		125～160		12	11	
		165～200		13	12	
		205～250		15	14	
	20	30～ 40	5	10	0	1
		45～ 50			8	2
		55～ 90		11	9	3
		95～150		12	10	
		155～200		15	13	
		205～260		16	14	
		265～300		18	16	
	25	40～ 60	5	10	8	2
		65～110		11	9	3
		115～160		12	10	
		165～200		15	13	
		205～260		16	14	
		265～300		18	16	
		305～350		22	20	
	28	50～ 60	5	12	10	2
		65～110		13	11	3
		115～160		14	12	
		165～200		16	14	
		205～260		18	16	
		265～300		20	18	

Part Number Type	D	L	E	E1	P1	No.of grooves (n)
GPHL GPH−XL GPSL GPS−XL GPHOT GPHOT−XL GPSOT	30	50～ 60	5	12	10	2
		65～100		13	11	
		105～160		14	12	3
		165～200		16	14	
		205～260		18	16	
		265～300		20	18	
		305～350		22	20	
		355～400		24	22	
	32	50～ 60	5	12	10	2
		65～100		13	11	
		105～160		14	12	3
		165～200		16	14	
		205～260		18	16	
		265～300		20	18	
		305～350		22	20	
	35	60～100	※8	14	12	2
		105～160		15	13	
		165～200		16	14	
		205～260		17	15	3
		265～330		18	16	
		335～400		19	17	
		405～450		20	18	
	40	80～140	8	26	24	2
		145～190		28	26	
		195～240		30	28	
		245～300		32	30	3
		305～380		34	32	
		385～450		36	34	
		455～500		38	36	
	50	100～150	8	28	26	2
		155～190		30	28	
		195～240		32	30	
		245～300		34	32	
		305～360		36	34	3
		365～400		38	36	
		405～460		40	38	
		465～500		42	40	
		505～550		44	42	
	60	200～240	8	30	28	2
		245～300		32	30	
		305～360		34	32	
		365～400		36	34	3
		405～460		38	36	
		465～500		40	38	
		505～550		42	42	

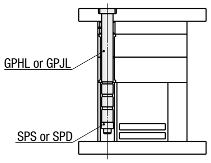
※GPHL・GPH−XL ···› E＝5

ex. Example

● Alteration Example of YC

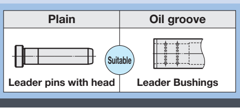


● Alteration Example of MC

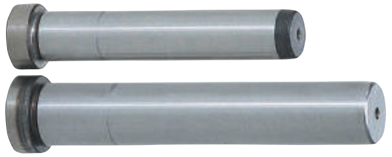


PRECISION LEADER PINS

— HEAD・PLAIN L DIMENSION SELECTION TYPE —

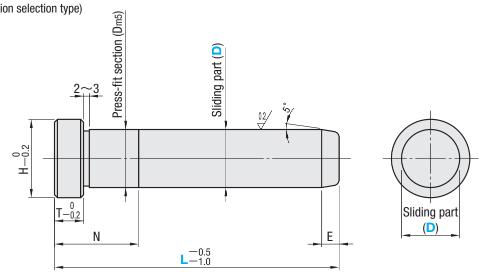


Non JIS material definition is listed on P.1351 - 1352

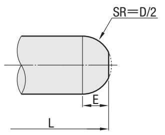


RoHS

GPH (L dimension selection type)



・Details of tip GPH8・GPH10



Recommended mold temperature for the usage of a precision leader pin and bushing is 80℃ or less because of a little clearance between them. (P.878)

A center hole may be left on one or both ends.

M SUJ2
H 58HRC~ (Induction hardening)

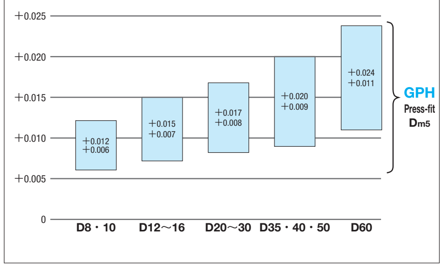
Order

Part Number	—	L
GPH20	—	140

Days to Ship **Quotation**

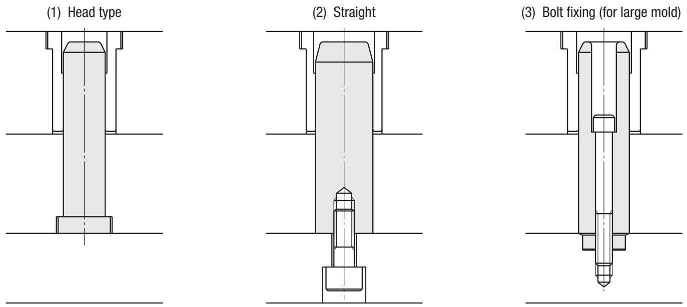
Price **Quotation**

■Chart of press-fit tolerance GPH



Example

■Example of mounting leader pins



(1) Head type

(2) Straight

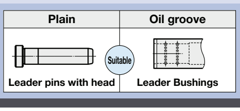
(3) Bolt fixing (for large mold)

Sliding part D		Press-fit section Dm5		T	H	E	N	Part Number Type	Part Number D	L selection	U/Price 1~9
8	−0.015 −0.020	8	+0.012 +0.006	5	11	3	14	GPH	8	30 35 40	Quotation
							19			45 50 60 70	
10		10			13	4	14		10	30 35 40	
							19			45 50 55 60 65 70	
12	−0.020 −0.025	12	+0.015 +0.007		17	5	14		12	30 35 40 45	
							19			50 55 60 65 70 75	
13		13			18		14		13	40	
							19			50 60 70	
							24			80 90	
							29			100 110	
							34			120	
16		16		8	21		19		16	50 60 70	
							24			80 90	
							29			100 110	
							34			120	
										130 140 150 160	
20	−0.025 −0.030	20	+0.017 +0.008		25		19		20	60	
							24			70 80	
							29			90	
										100 110	
							34			120 130 140 150	
							39			160 170 180 190 200	
25		25			30		24		25	70	
							29			80 90	
							34			100 110	
							39			120 130 140 150	
							44			160	
										170 180 190	
							49			200	
30		30			35		34		30	100 110	
							39			120 130 140 150	
							44			160 170 180 190 200	
							49			210 220 230	
							54			240 250	
35	−0.030 −0.035	35	+0.020 +0.009		40		44		35	150	
							49			170	
							54			180 190 200 210 220	
							59			230 240 250	
40	−0.030 −0.040	40		10	45	8	54		40	200 210 220	
							59			240 250 260	
							64			270 280	
							69			290 300	
50		50		12	55		59		50	260 280 300	
							64			320 340 360	
							69			380 400 420	
60	−0.030 −0.050	60	+0.024 +0.011	15	65		64		60	350 370 390	
							69			420 440 460	

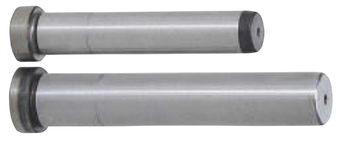
You can order products of the same size by designation the press-fit part length of the precision grade guide pin GPHL (P.883).

PRECISION LEADER PINS

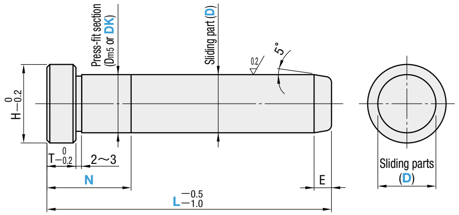
— HEAD・PLAIN PRESS-FIT LENGTH DESIGNATION TYPE・PRESS-FIT DIAMETER・LENGTH DESIGNATION TYPE —



Non JIS material definition is listed on P.1351 - 1352



GPHL (Press-fit diameter Dm5・length designation type)
GPH−XL (Press-fit diameter・length designation type)



Sliding parts D		Press-fit section Dm5 GPHL		T	H	E
8	$^{-0.015}_{-0.020}$	8	$^{+0.012}_{+0.006}$	5	11	3
10		10			13	4
12	$^{-0.020}_{-0.025}$	12	$^{+0.015}_{+0.007}$		17	5
13		13			18	
16		16		8	21	
20	$^{-0.025}_{-0.030}$	20	$^{+0.017}_{+0.008}$		25	
25		25			30	
28		28			33	
30		30			35	
32	$^{-0.030}_{-0.035}$	32	$^{+0.020}_{+0.009}$		37	
35		35			40	
40	$^{-0.030}_{-0.040}$	40		10	45	8
50		50		12	55	
60	$^{-0.030}_{-0.050}$	60	$^{+0.024}_{+0.011}$	15	65	

M SUJ2 H 58HRC〜(Induction hardening)

Recommended mold temperature for the usage of a precision leader pin and bushing is 80°C or less because of a little clearance between them. (P.878)

A center hole may be left on one or both ends.

Order

Part Number	—	L	—	N	—	DK
GPHL 25	—	250	—	N100		
GPH−XL25	—	250	—	N100	—	DK25.009

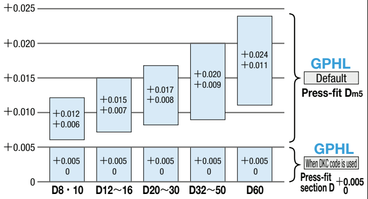
Days to Ship Quotation

Alterations

Part Number — L(LC) — N — DK — (OC・MC・GC···etc.)
GPH−XL 25 — LC 249 — N100 — DK25.009 — GC — E20 — K10

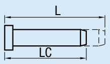
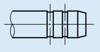
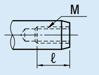
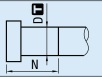
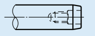
Combination of GC with OC not available.

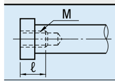
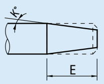
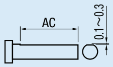
■Chart of press-fit tolerance GPHL



Press-fit (DK) can be designated at 0.001mm increments for GPH−XL.

Alteration details P.879・880

<table>
<tr><th>Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td> </td><td>LC</td><td>Total length alteration LC=1mm increments
Shortens the full length (L) as shown in the drawing.
(Tip dimension E remains unchanged.)
Lmin.<LC<Lmax.</td><td>Quotation</td></tr>
<tr><td></td><td>OC</td><td>Adds oil grooves.
Please note that the designation range of N dimension is changed.
Alteration details P.880</td><td></td></tr>
<tr><td> </td><td>MC</td><td>Tip tapping
Not available for D=8 or 10<table><tr><th>D</th><th>M×Pitch</th><th>ℓ</th></tr><tr><td>12・13</td><td>M 6×1.0</td><td>12</td></tr><tr><td>16</td><td>M10×1.5</td><td>20</td></tr><tr><td>20</td><td>M12×1.75</td><td>24</td></tr><tr><td>25〜60</td><td>M16×2.0</td><td>32</td></tr></table></td><td></td></tr>
<tr><td> </td><td>DKC</td><td>Press-fit section tolerance alteration
D_{m5} ··· $D^{+0.005}_{0}$
Available for GPHL</td><td></td></tr>
<tr><td></td><td>GA</td><td>Adds a tap to attach a leader assist pin.
Available for D40・50・60.
Alteration details P.879</td><td></td></tr>
</table>

<table>
<tr><th>Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td> </td><td>MMC</td><td>Tapping on the head
Not available for D=8 and 10.<table><tr><th>D</th><th>M×Pitch</th><th>ℓ</th></tr><tr><td>12〜20</td><td>M5×0.8</td><td>10</td></tr><tr><td>25〜60</td><td>M8×1.25</td><td>16</td></tr></table></td><td>Quotation</td></tr>
<tr><td> The tapered part is to be cut.</td><td>GC</td><td>Tapers the tip.
Designation method GC−E20−K10
E=1mm increments
K=1° increments 1°≦K≦10°
E>20 of D16〜30 is available only when L≧50.<table><tr><th>D</th><th>E</th></tr><tr><td>8・10</td><td>5≦E≦15</td></tr><tr><td>12・13</td><td>5≦E≦20</td></tr><tr><td>16</td><td>5≦E≦25</td></tr><tr><td>20</td><td>5≦E≦30</td></tr><tr><td>25・28</td><td>5≦E≦35</td></tr><tr><td>30</td><td>5≦E≦40</td></tr><tr><td>32〜60</td><td>5≦E≦20</td></tr></table>Alteration details when combination with MC P.879</td><td></td></tr>
<tr><td> </td><td>AC</td><td>Groove processing for air relief
Designation method AC124
AC=1mm increments
10≦AC≦L−(N+5)</td><td></td></tr>
</table>

P Price Quotation

■GPHL (Press-fit diameter Dm5・length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	U/Price 1〜9
GPHL	8	30〜 40	10〜 60	Quotation
		45〜 50		
		55〜 80		
	10	30〜 40		
		45〜 50		
		55〜 80		
	12	30〜 40	10〜 80	
		45〜 80		
		85〜120		
		125〜160		
		165〜200		
	13	30〜 40		
		45〜 80		
		85〜120		
		125〜160		
		165〜200		
	16	30〜 40	13〜 80	
		45〜 80		
		85〜120		
		125〜160		
		165〜200		
		205〜250		
	20	30〜 50	13〜100	
		55〜 90		
		95〜150		
		155〜200		
		205〜260		
		265〜300		
GPHL	25	40〜 60	13〜120	Quotation
		65〜110		
		115〜160		
		165〜200		
		205〜260		
		265〜300		
		305〜350		
	28	50〜 60		
		65〜110		
		115〜160		
		165〜200		
		205〜260		
		265〜300		
	30	50〜 60	13〜130	
		65〜100		
		105〜160		
		165〜200		
		205〜260		
		265〜300		
		305〜350		
		355〜400		
	32	50〜 60		
		65〜100		
		105〜160		
		165〜200		
		205〜260		
		265〜300		
		305〜350		
GPHL	35	60〜100	13〜130	Quotation
		105〜160		
		165〜200		
		205〜260		
		265〜330		
		335〜400		
		405〜450		
	40	80〜140	15〜200	
		145〜190		
		195〜240		
		245〜300		
		305〜380		
		385〜450		
		455〜500		
	50	100〜150	17〜200	
		155〜190		
		195〜240		
		245〜300		
		305〜360		
		365〜400		
		405〜460		
		465〜500		
		505〜550		
	60	200〜250	20〜200	
		255〜300		
		305〜350		
		355〜400		
		405〜450		
		455〜500		
		505〜550		

Designate Nmin. value when no press-fit section is required.ex. D=13 ··· N=5

Please designate process-fit length with N≦L−E.

No press-fitting section when N=T+(2 or 3).

■GPH−XL (Press-fit diameter・length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	Press-fit diameter DK 0.001mm increments	U/Price 1〜9
GPH−XL	8	30〜 50	10〜 60	8.000〜 8.050	Quotation
		55〜 80			
	10	30〜 50		10.000〜10.050	
		55〜 80			
	12	30〜 50	10〜 80	12.000〜12.050	
		55〜 80			
		85〜120			
		125〜160			
		165〜200			
	13	30〜 50		13.000〜13.050	
		55〜 80			
		85〜120			
		125〜160			
		165〜200			
	16	30〜 50	13〜 80	16.000〜16.050	
		55〜 80			
		85〜120			
		125〜160			
		165〜200			
		205〜250			
	20	30〜 60	13〜100	20.000〜20.050	
		65〜110			
		115〜160			
		165〜200			
		205〜260			
		265〜300			
	25	40〜 60	13〜120	25.000〜25.050	
		65〜110			
		115〜160			
		165〜200			
		205〜260			
		265〜300			
		305〜350			
	28	50〜 60		28.000〜28.050	
		65〜110			
		115〜160			
		165〜200			
		205〜260			
		265〜300			
	30	50〜 60	13〜130	30.000〜30.050	
		65〜110			
		115〜160			
		165〜200			
		205〜260			
		265〜300			
		305〜350			
		355〜400			
GPH−XL	32	50〜 60	13〜130	32.000〜32.050	Quotation
		65〜110			
		115〜160			
		165〜200			
		205〜260			
		265〜300			
		305〜350			
	35	60		35.000〜35.050	
		65〜110			
		115〜160			
		165〜200			
		205〜260			
		265〜300			
		305〜350			
		355〜400			
		405〜450			
	40	80〜150	15〜200	40.000〜40.050	
		155〜190			
		195〜250			
		255〜300			
		305〜360			
		365〜400			
		405〜460			
		465〜500			
	50	100〜150	17〜200	50.000〜50.050	
		155〜190			
		195〜250			
		255〜300			
		305〜360			
		365〜400			
		405〜460			
		465〜500			
		505〜550			
	60	200〜250	20〜200	60.000〜60.050	
		255〜300			
		305〜360			
		365〜400			
		405〜460			
		465〜500			
		505〜550			

DK tolerance of press-fit diameter of D8〜30: DK±0.002

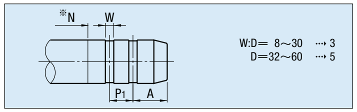
DK tolerance of press-fit diameter of D32〜60: DK±0.003

Designate press-fit length with N≦L−E.

■**Oil-groove dimensions (GPJ,GPJL,GPJ—XL)**

※Please note that in order to avoid interference between press-fit length and oil groove, Nmax. is provided as shown in the table below.

GPJ	P.886
GPJL	P.887
GPJ—XL	P.887



(Oil groove width (W) 3mm)※D=32 W5mm

L dimension	D=8~16 Nmax.	A	P1	Number of grooves	D=20 Nmax.	A	P1	Number of grooves	D=25 Nmax.	A	P1	Number of grooves	D=28~32※ Nmax.	A	P1	Number of grooves
40	16	14	8	2	—	—	—	—	—	—	—	—	—	—	—	—
45		15	9													
50	24				24	15	8	2	24	15	8	2	24	17	10	2
55						16	9									
60				3	30				30				30			
65										16	9			18	11	
70	35				35				40				37			
75								3								
80	45				40							3	45			
85		16	10													
90	50				50				50				50			
95						17	10									
100	60				60				60				60			
105														19	12	
110	70				70				70							3
115										17	10					
120	80				80				80				70			
125		17	11													
130					90				90				80			
135																
140					100				100				90			
145																
150									110				100			
155						20	13									
160									120				110			
165		18	13						117	20	13			21	14	
170									120				120			
175																
180																
185																
190																
195																
200																
210		20	14							21	14			23	16	
220																
230																
240																
250																
260	—	—	—	—												
270										23	16			25	18	
280																
290																
300																
310					—	—	—	—								
320																
330																
340																
350																
360									—	—	—	—				
370																
380																
390																
400																

(Oil groove width (W) 5mm)

L dimension	D=35 Nmax.	A	P1	Number of grooves	D=40 Nmax.	A	P1	Number of grooves	D=50 · 60 Nmax.	A	P1	Number of grooves
70	35	19	12	2	—	—	—	—	—	—	—	—
75												
80	45											
85												
90	50											
95												
100	60				40	32	22	2				
105		20	13									
110				3	50							
115												
120	70				60				50	36	26	2
125												
130	80								60			
135												
140	90				70				70			
145						35	25					
150	100				80				80			
155												
160	110									38	28	
165		21	14									
170	120							3				
175												
180	130				90							3
185												
190												
195						38	28		90	40	30	
200					100							
210		22	15									
220					110				100			
230												
240					120				110			
250										42	32	
260					130				120			
270		23	16									
280					140				130			
290						40	30		140			
300												
310						42	32		150	44	34	
320												
330									160			
340		24	17									
350									170			
360									180			
370									190	46	36	
380												
390						44	34		200			
400												
410										48	38	
420												
430												
440												
450												
460	—	—	—	—								
470										50	40	
480												
490												
500												
510					—	—	—	—				
520												
530												
540												
550												

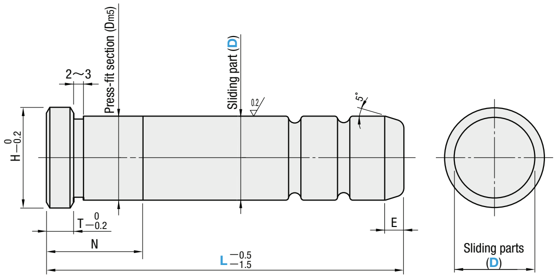
Oil groove	Plain
Leader pins with head	Leader Bushing

Suitable

Non JIS material definition is listed on P.1351 - 1352

RoHS

GPJ (L dimension selection type)



- Oil grooves P.885
- Recommended mold temperature for the usage of a precision leader pin and bushing is 80˚C or less because of a little clearance between them. (P.878)
- A center hole may be left on one or both ends.
- Oil groove part might not be colored by heat treatment.

M SUJ2
H 58HRC~ (Induction hardening)

Sliding parts D		Press-fit section Dm5		T	H	E	N	Part Number Type	Part Number D	L Selection	U/Price 1~9
10	−0.015 −0.020	10	+0.012 +0.006	5	13	4	16	GPJ	10	45	Quotation
							24			55	
							35			70	
12	−0.020 −0.025	12	+0.015 +0.007		17	5	16		12	45	
							24			55	
							20			70	
16		16		6	21		16		16	45	
							24			55 60	
20	−0.025 −0.030	20	+0.017 +0.008		25		24		20	55	
							30			60 65 *70A	
							35			*70B 75	

Order

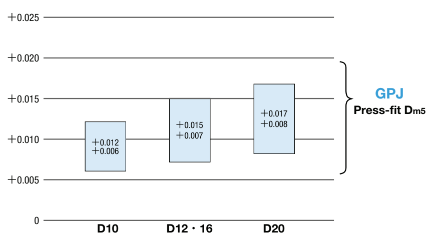
Part Number	—	L
GPJ20	—	55

Days to Ship Quotation

Price Quotation

* When GPJ20—70A, N=30
When GPJ20—70B, N=35

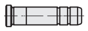
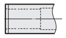
■**Chart of press-fit tolerance** GPJ



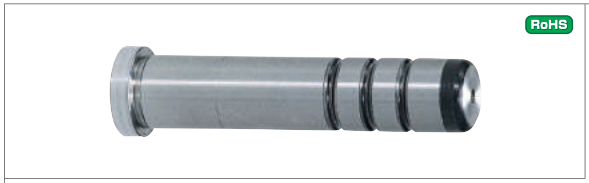
Leader Components

PRECISION LEADER PINS

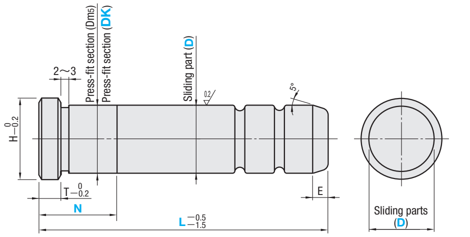
— HEAD · OIL GROOVE PRESS-FIT LENGTH DESIGNATION TYPE/PRESS-FIT DIAMETER · LENGTH DESIGNATION TYPE —

Oil groove	Plain
 Suitable	
Leader pins with head	Leader Bushing

Non JIS material definition is listed on P.1351 - 1352

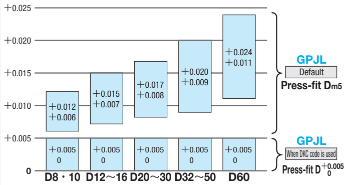


GPJL (Press-fit diameter D_{m5} · length designation type)
GPJ−XL (Press-fit diameter · length designation type)



Sliding parts D		Press-fit Section D_{m5}		Press-fit Section DK tolerance	T	H	E
8	−0.015 −0.020	8	+0.012 +0.006	DK ±0.002	5	11	3
10		10				13	4
12	−0.020 −0.025	12	+0.015 +0.007			17	5
13		13			6	18	
16		16				21	
20	−0.025 −0.030	20	+0.017 +0.008			25	
25		25			8	30	
28		28				33	
30		30				35	
32	−0.030 −0.040	32	+0.020 +0.009	DK ±0.003		37	
35		35				40	
40		40			10	45	8
50		50			12	56	
60	−0.030 −0.050	60	+0.024 +0.011		15	65	

■Chart of press-fit tolerance **GPJL**



- Oil grooves P.885
- Recommended mold temperature for the usage of a precision leader pin and bushing is 80°C or less because of a little clearance between them. (P.878)
- A center hole may be left on one or both ends.
- Oil groove part might not be colored by heat treatment.

M SUJ2
H 58HRC~ (Induction hardening)

Order

Part Number	— L — N — DK
Type D	
GPJL 25	— 150 — N80
GPJ−XL 25	— 150 — N80 — DK25.015

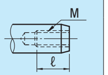
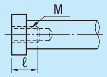
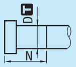
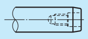
Days to Ship Quotation

Price Quotation

Alterations

Part Number — L — N — DK — (MC · MMC···etc.)
GPJL25 — 180 — N100 — MC
GPJ−XL25 — 180 — N100 — DK25.015 — MC

Alteration details P.879

Alterations	Code	Spec.	1Code
	MC	Tip tapping ⊗ D=Not available for 8, 10. D / M×Pitch / ℓ 12 · 13 / M 6×1.0 / 12 16 / M10×1.5 / 20 20 / M12×1.75 / 24 25~60 / M16×2.0 / 32	Quotation
	MMC	Tapping on the head ⊗ D=Not available for 8, 10. D / M×Pitch / ℓ 12~20 / M5×0.8 / 10 25~60 / M8×1.25 / 16	
	DKC	Changes press-fit section tolerance. D_{m5} ··· $D^{+0.005}_{0}$ Available for GPJL	
	GA	Adds a tap to attach a leader assist pin. Available for D40 · 50 · 60 **Alteration details P.879**	

Type	GPJL		
D	L	N 1mm inc.	U/Price 1~9
8	40 45	5~16	Quotation
	50 55 60 65	5~24	
	70 75	5~35	
	80	5~45	
10	40 45	5~16	
	50 55 60 65	5~24	
	70 75	5~35	
	80	5~45	
12	40 45	5~16	
	50 55 60 65	5~24	
	70 75	5~35	
	80 85	5~45	
	90 95	5~50	
	100 105	5~60	
	110 115	5~70	
	120~160 (5mm inc.)	5~80	
	165~200 (5mm inc.)		
13	40	6~16	
	45		
	50 55 60 65	6~24	
	70 75	6~35	
	80	6~45	
	85		
	90 95	6~50	
	100 105	6~60	
	110 115	6~70	
	120	6~80	
	125~160 (5mm inc.)		
	165~200 (5mm inc.)		
16	40	6~16	
	45		
	50 55 60 65	6~24	
	70 75	6~35	
	80	6~45	
	85		
	90 95	6~50	
	100 105	6~60	
	110 115	6~70	
	120	6~80	
	125~160 (5mm inc.)		
	165~200 (5mm inc.)		
	210~250 (10mm inc.)		

Type	GPJ−XL			
D	L	N 1mm inc.	DK 0.001mm inc.	U/Price 1~9
8	40 45	10~16	8.000 ≀ 8.050	Quotation
	50	10~24		
	55 60 65			
	70 75	10~35		
	80	10~45		
10	40 45	10~16	10.000 ≀ 10.050	
	50	10~24		
	55 60 65			
	70 75	10~35		
	80	10~45		
12	40 45	10~16	12.000 ≀ 12.050	
	50	10~24		
	55 60 65			
	70 75	10~35		
	80 85	10~45		
	90 95	10~50		
	100 105	10~60		
	110 115	10~70		
	120	10~80		
	125~160 (5mm inc.)			
	165~200 (5mm inc.)			
13	40 45	11~16	13.000 ≀ 13.050	
	50	11~24		
	55 60 65			
	70 75	11~35		
	80 85	11~45		
	90 95	11~50		
	100 105	11~60		
	110 115	11~70		
	120	11~80		
	125~160 (5mm inc.)			
	165~200 (5mm inc.)			
16	40 45	11~16	16.000 ≀ 16.050	
	50	11~24		
	55 60 65			
	70 75	11~35		
	80 85	11~45		
	90 95	11~50		
	100 105	11~60		
	110 115	11~70		
	120	11~80		
	125~160 (5mm inc.)			
	165~200 (5mm inc.)			
	210~250 (10mm inc.)			

Type	GPJL		
D	L	N 1mm inc.	U/Price 1~9
20	50	6~24	Quotation
	55		
	60 65	6~30	
	70 75	6~35	
	80 85	6~40	
	90	6~50	
	95		
	100 105	6~60	
	110 115	6~70	
	120 125	6~80	
	130 135	6~90	
	140 145 150	6~100	
	155~200 (5mm inc.)		
	210~260 (10mm inc.)		
	270~300 (10mm inc.)		
25	50 55	8~24	
	60	8~30	
	65		
	70 75 80 85	8~40	
	90 95	8~50	
	100 105	8~60	
	110	8~70	
	115		
	120 125	8~80	
	130 135	8~90	
	140 145	8~100	
	150 155	8~110	
	160	8~120	
	165	8~117	
	170~200 (5mm inc.)	8~120	
	210~260 (10mm inc.)		
	270~300 (10mm inc.)		
	310~350 (10mm inc.)		
28	50 55	8~24	
	60 65	8~30	
	70 75	8~37	
	80 85	8~45	
	90 95	8~50	
	100 105	8~60	
	110 115		
	120 125	8~70	
	130 135	8~80	
	140 145	8~90	
	150 155	8~100	
	160 165	8~110	
	170~200 (5mm inc.)	8~120	
30	60	8~30	
	65		
	70 75	8~37	
	80 85	8~45	
	90 95	8~50	
	100 105 110	8~60	
	115		
	120 125	8~70	
	130 135	8~80	
	140 145	8~90	
	150 155	8~100	
	160	8~110	
	165		
	170~200 (5mm inc.)	8~120	
	210~260 (10mm inc.)		
	270~300 (10mm inc.)		
	310~350 (10mm inc.)		
	360~400 (10mm inc.)		
32	70 75	8~37	
	80 85	8~45	
	90 95	8~50	
	100 105 110 115	8~60	
	120 125	8~70	
	130 135	8~80	
	140 145	8~90	
	150 155	8~100	
	160 165	8~110	
	170 175	8~120	
	180~200 (5mm inc.)		
	210~260 (10mm inc.)		
	270~300 (10mm inc.)		
	310~350 (10mm inc.)		

Type	GPJ−XL			
D	L	N 1mm inc.	DK 0.001mm inc.	U/Price 1~9
20	50	11~24	20.000 ≀ 20.050	Quotation
	55			
	60 65	11~30		
	70 75	11~35		
	80 85	11~40		
	90 95	11~50		
	100 105	11~60		
	110 115	11~70		
	120	11~80		
	125			
	130 135	11~90		
	140~160 (5mm inc.)	11~100		
	165~200 (5mm inc.)			
	210~260 (10mm inc.)			
	270~300 (10mm inc.)			
25	50 55	13~24	25.000 ≀ 25.050	
	60 65	13~30		
	70 75 80 85	13~40		
	90 95	13~50		
	100 105	13~60		
	110 115	13~70		
	120	13~80		
	125			
	130 135	13~90		
	140 145	13~100		
	150 155	13~110		
	160	13~120		
	165	13~117		
	170~200 (5mm inc.)	13~120		
	210~260 (10mm inc.)			
	270~300 (10mm inc.)			
	310~350 (10mm inc.)			
28	50 55	13~24	28.000 ≀ 28.050	
	60 65	13~30		
	70 75	13~37		
	80 85	13~45		
	90 95	13~50		
	100 105 110 115	13~60		
	120	13~70		
	125			
	130 135	13~80		
	140 145	13~90		
	150 155	13~100		
	160	13~110		
	165			
	170~200 (5mm inc.)	13~120		
30	60 65	13~30	30.000 ≀ 30.050	
	70 75	13~37		
	80 85	13~45		
	90 95	13~50		
	100 105 110 115	13~60		
	120	13~70		
	125			
	130 135	13~80		
	140 145	13~90		
	150 155	13~100		
	160	13~110		
	165			
	170~200 (5mm inc.)	13~120		
	210~260 (10mm inc.)			
	270~300 (10mm inc.))			
	310~350 (10mm inc.)			
	360~400 (10mm inc.)			
32	70 75	13~37	32.000 ≀ 32.050	
	80 85	13~45		
	90 95	13~50		
	100 105 110 115	13~60		
	120	13~70		
	125			
	130 135	13~80		
	140 145	13~90		
	150 155	13~100		
	160	13~110		
	165			
	170~200 (5mm inc.)	13~120		
	210~260 (10mm inc.)			
	270~300 (10mm inc.)			
	310~350 (10mm inc.)			

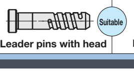
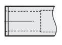
Type	GPJL		
D	L	N 1mm inc.	U/Price 1~9
35	70 75	8~35	Quotation
	80 85	8~45	
	90 95	8~50	
	100	8~60	
	105 110 115		
	120 125	8~70	
	130 135	8~80	
	140 145	8~90	
	150 155	8~100	
	160	8~110	
	165		
	170 175	8~120	
	180~200 (5mm inc.)	8~130	
	210~260 (10mm inc.)		
	270~330 (10mm inc.)		
	340~400 (10mm inc.)		
	410~450 (10mm inc.)		
40	100 105	10~40	
	110 115	10~50	
	120~135 (5mm inc.)	10~60	
	140	10~70	
	145		
	150~175 (5mm inc.)	10~80	
	180 185 190	10~90	
	195		
	200 210	10~100	
	220 230	10~110	
	240	10~120	
	250		
	260 270	10~130	
	280 290 300	10~140	
	310~380 (10mm inc.)		
	390~450 (10mm inc.)		
	460~500 (10mm inc.)		
50	120 125	12~50	
	130 135	12~60	
	140 145	12~70	
	150	12~80	
	155~185 (5mm inc.)		
	190	12~90	
	195 200		
	210		
	220 230	12~100	
	240	12~110	
	250		
	260 270	12~120	
	280	12~130	
	290 300	12~140	
	310 320	12~150	
	330 340	12~160	
	350	12~170	
	360	12~180	
	370 380	12~190	
	390 400	12~200	
	410~460 (10mm inc.)		
	470~500 (10mm inc.)		
	510~550 (10mm inc.)		
60	200 210	15~90	
	220 230	15~100	
	240	15~110	
	250		
	260 270	15~120	
	280	15~130	
	290 300	15~140	
	310 320	15~150	
	330 340	15~160	
	350	15~170	
	360	15~180	
	370 380	15~190	
	390 400	15~200	
	410~460 (10mm inc.)		
	470~500 (10mm inc.)		
	510~550 (10mm inc.)		

Type	GPJ−XL			
D	L	N 1mm inc.	DK 0.001mm inc.	U/Price 1~9
35	70 75	13~35	35.000 ≀ 35.050	Quotation
	80 85	13~45		
	90 95	13~50		
	100~115 (5mm inc.)	13~60		
	120	13~70		
	125			
	130 135	13~80		
	140 145	13~90		
	150 155	13~100		
	160	13~110		
	165			
	170 175	13~120		
	180~200 (5mm inc.)	13~130		
	210~260 (10mm inc.)			
	270~300 (10mm inc.)			
	310~350 (10mm inc.)			
	360~400 (10mm inc.))			
	410~450 (10mm inc.)			
40	100 105	15~40	40.000 ≀ 40.050	
	110 115	15~50		
	120~135 (5mm inc.)	15~60		
	140 145	15~70		
	150	15~80		
	155~175 (5mm inc.)			
	180 185 190	15~90		
	195			
	200 210	15~100		
	220 230	15~110		
	240	15~120		
	250			
	260 270	15~130		
	280~300 (10mm inc.)	15~140		
	310~360 (10mm inc.)			
	370~400 (10mm inc.)			
	410~460 (10mm inc.)			
	470~500 (10mm inc.)			
50	120 125	17~50	50.000 ≀ 50.050	
	130 135	17~60		
	140 145	17~70		
	150	17~80		
	155~185 (5mm inc.)			
	190	17~90		
	195			
	200 210			
	220 230	17~100		
	240	17~110		
	250			
	260 270	17~120		
	280	17~130		
	290 300	17~140		
	310 320	17~150		
	330 340	17~160		
	350	17~170		
	360	17~180		
	370 380	17~190		
	390 400	17~200		
	410~460 (10mm inc.)			
	470~500 (10mm inc.)			
	510~550 (10mm inc.)			
60	200 210	20~90	60.000 ≀ 60.050	
	220 230	20~100		
	240	20~110		
	250			
	260 270	20~120		
	280	20~130		
	290 300	20~140		
	310 320	20~150		
	330 340	20~160		
	350	20~170		
	360	20~180		
	370 380	20~190		
	390 400	20~200		
	410~460 (10mm inc.)			
	470~500 (10mm inc.)			
	510~550 (10mm inc.)			

- Designate Nmin. value when no press-fit section is required.
  ex.D=40 ··· N=10
- No press-fitting section when N=T+(2 or 3).

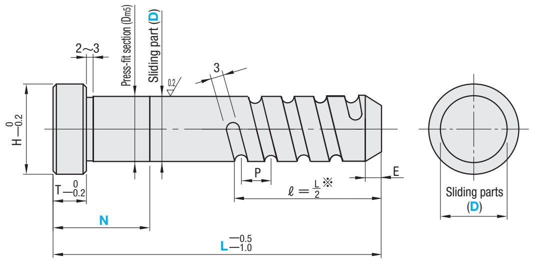
PRECISION LEADER PINS

—HEAD · SPIRAL GROOVE PRESS-FIT LENGTH DESIGNATION TYPE—

Spiral groove	Plain
 Suitable Leader pins with head	 Leader Bushing

Non JIS material definition is listed on P.1351 - 1352

GPHLSP (Press-fit diameter Dm5 · length designation type)



Sliding parts D		Press-fit section D_{m5}		T	H	E
20	−0.025 −0.030	20	+0.017 +0.008	8	25	5
25		25			30	
30		30			35	
40	−0.030 −0.040	40	+0.020 +0.009	10	45	8
50		50		12	55	

※ The length of the spiral groove (ℓ) will be one half of the overall length (L/2), regardless of the N dimension.

- Recommended mold temperature for the usage of a precision leader pin and bushing is 80A or less because of a little clearance between them. (P.878)
- A center hole may be left on one or both ends.
- Oil groove part might not be colored by heat treatment. Despite appearance differences, it can be used without any problem.

M SUJ2
H 58HRC~
(Induction hardening)

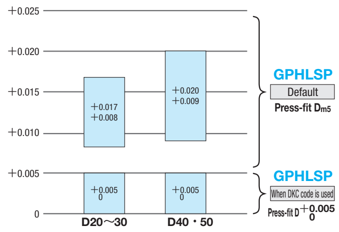
Order Part Number — L — N
GPHLSP25 — 100 — N24

Days to Ship Quotation

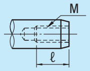
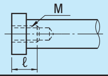
Price Quotation

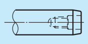
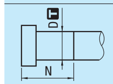
Alterations Part Number — L — N — (MC · MMC · GA · DKC)
GPHLSP20 — 100 — N24 — MC

■Chart of press-fit tolerance GPHLSP



Alteration details P.879

Alterations	Code	Spec.	1Code
	MC	Tip tapping D / M×Pitch / ℓ 20 / M12×1.75 / 24 25~50 / M16×2.0 / 32	Quotation
	MMC	Tapping on the head D / M×Pitch / ℓ 20 / M5×0.8 / 10 25~50 / M8×1.25 / 16	

Alterations	Code	Spec.	1Code
	GA	Adds a tap to attach a leader assist pin. Available for D40 · 50 Alteration detail P.879	Quotation
	DKC	Changes press-fit section tolerance. Dm5 ···› D +0.005 0	

■Spiral groove dimensions

L	60~70	80~120	130~180	190~300	310~360
P	10	15	20	25※	30

※D=20~30 ···› P=23

Part Number		L						N	U/Price
Type	D	Selection						1mm increments	1~9
GPHLSP	20	60	70	80	90			8≦N<L/2	Quotation
		100	110	120	130	140	150		
		170	200						
		210							
	25	60							
		70	80	90	100	110			
		120	130	140	150	160			
		170	200						
		210	220	230					
	30	130	140	150	160				
		170	180	190	200				
		210	220	230					
	40	200	210	220	230	240		10≦N<L/2	
		250	260	270	280	290	300		
		310	320	330	340	350	360		
	50	230	240					12≦N<L/2	
		250	260	270	280	290	300		
		310	320	330	340	350			

- When no press-fit part is required, specify Nmin.
- The N dimension also includes the head thickness and the undercut below the head, so in case of N=T+(2 or 3), there will be no press-fit part.
- When the overall length (L dimension) and the diameter of the press-fit part are freely specified, please order using GPHL and GPH-XL (P.883).

■Feature of spiral groove

- The ring oil groove that has been widely used up until now retains the lubricating oil, and applies a suitable amount of oil when the guide pin and the guide bushing touch each other, thus helping to prevent seizure.
  In contrast, a spiral groove retains lubricating oil, and when the guide pin and the guide bushing come into contact with each other, the lubricating oil moves around the entire periphery of the pin along the spiral groove, resulting in greater seizure prevention effectiveness.

PRECISION LEADER PINS WITH SPIRAL VENT

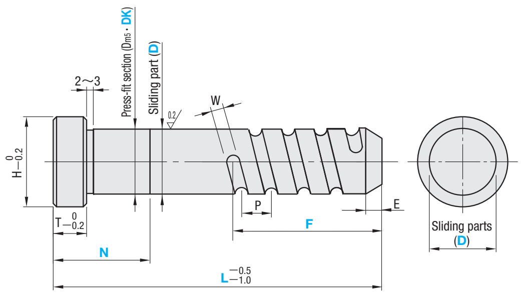
—HEAD・SPIRAL GROOVE PRESS-FIT LENGTH DESIGNATION TYPE・PRESS-FIT DIAMETER・LENGTH DESIGNATION TYPE—

Spiral groove	Plain
Suitable	
Leader pins with head	Leader Bushing

Non JIS material definition is listed on P.1351 - 1352

RoHS

GPHLOC	(Press-fit diameter Dm5・length designation・spiral groove fixed length)
GPHLOF	(Press-fit diameter Dm5・length designation・spiral groove length designation)
GPH−XLOC	(Press-fit diameter DK designation・length designation・spiral groove fixed length)
GPH−XLOF	(Press-fit diameter DK designation・length designation・spiral groove length designation)



Sliding parts D		Press-fit section Dm5 GPHLOC GPHLOF		T	H	E	W
8	−0.015 −0.020	8	+0.012 +0.006	5	11	3	2
10		10			13	4	
12	−0.020 −0.025	12	+0.015 +0.007		17	5	3
13		13			18		
16		16		8	21		
20	−0.025 −0.030	20	+0.017 +0.008		25		
25		25			30		
28		28			33		
30		30			35		
32	−0.030 −0.035	32	+0.020 +0.009		37		
35		35			40		
40	−0.030 −0.040	40		10	45	8	
50		50		12	55		
60	−0.030 −0.050	60	+0.024 +0.011	15	65		

L	P	F dimension GPHLOC・GPH−XLOC
30～ 70	10	When, $L-N>\frac{L}{2}$ $F=\frac{L}{2}$ When, $L-N\leqq\frac{L}{2}$ $F=L-(N+10)$
75～120	15	
125～180	20	
185～300	25※	
305～550	30※	

※D=8～32 ···▸ P=23

Recommended mold temperature for the usage of a precision leader pin and bushing is 80°C or less because of a little clearance between them. (P.878)

A center hole may be left on one or both ends.

Oil groove part might not be colored by heat treatment. Despite appearance differences, it can be used without any problem.

M SUJ2

H 58HRC～

(Induction hardening)

Order

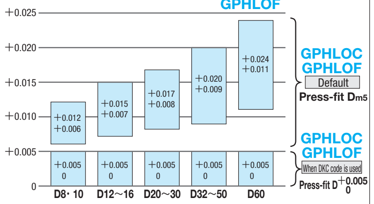
Part Number	—	L	—	N	—	F	—	DK
GPHLOC 25	—	250	—	N100				
GPH−XLOF25	—	250	—	N100	—	F140	—	DK25.009

Days to Ship Quotation

Alterations

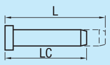
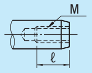
Part Number	—	L(LC)	—	N	—	F	—	DK	—	(MC···etc.)
GPH−XLOF 25	—	LC 249	—	N100	—	F140	—	DK25.009	—	MC

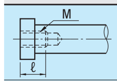
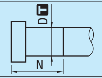
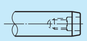
■ Chart of press-fit tolerance GPHLOC GPHLOF



Press-fit (DK) can be designated at 0.001mm increments for GPH−XLOC・GPH− XLOF

Alteration details P.879・880

Alterations	Code	Spec.	1Code
	LC	Total length alteration LC=1mm increments Shortens the full length (L) as shown in the drawing. (Tip dimension E remains unchanged.) Lmin.＜LC＜Lmax.	Quotation
	MC	Tip tapping ⊗ Not available for D=8 or 10. D / M×Pitch / ℓ 12・13 / M 6×1.0 / 12 16 / M10×1.5 / 20 20 / M12×1.75 / 24 25～60 / M16×2.0 / 32	

Alterations	Code	Spec.	1Code
	MMC	Tapping on the head ⊗ Not available for D=8 or 10. D / M×Pitch / ℓ 12～20 / M5×0.8 / 10 25～60 / M8×1.25 / 16	Quotation
	DKC	Press-fit section tolerance alteration Dm5 ···▸ $D^{+0.005}_{0}$ Available for GPHLOC, GPHLOF	
	GA	Adds a tap to attach a leader assist pin. Available for D40・50・60. **Alteration details P.879**	

P Price Quotation

■GPHLOC・GPHLOF (Press-fit length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	F 1mm increments	U/Price 1～9 GPHLOC	U/Price 1～9 GPHLOF
Spiral groove fixed length GPHLOC Spiral groove length designation GPHLOF	8	30～ 40	5～ 60	GPHLOF F≧E+P and F≦L−N GPHLOC is no designation necessary for F	Quotation	
		45～ 50				
		55～ 80				
	10	30～ 40				
		45～ 50				
		55～ 80				
	12	30～ 40	5～ 80			
		45～ 80				
		85～120				
		125～160				
		165～200				
	13	30～ 40				
		45～ 80				
		85～120				
		125～160				
		165～200				
	16	30～ 40	8～ 80			
		45～ 80				
		85～120				
		125～160				
		165～200				
		205～250				
	20	30～ 50	8～100			
		55～ 90				
		95～150				
		155～200				
		205～260				
		265～300				
	25	40～ 60	8～120			
		65～110				
		115～160				
		165～200				
		205～260				
		265～300				
		305～350				
	28	50～ 60				
		65～110				
		115～160				
		165～200				
		205～260				
		265～300				
	30	50～ 60	8～130			
		65～100				
		105～160				
		165～200				
		205～260				
		265～300				
		305～350				
		355～400				
	32	50～ 60				
		65～100				
		105～160				
		165～200				
		205～260				
		265～300				
		305～350				
	35	60～100	8～130			
		105～160				
		165～200				
		205～260				
		265～330				
		335～400				
		405～450				
	40	80～140	10～200			
		145～190				
		195～240				
		245～300				
		305～380				
		385～450				
		455～500				
	50	100～150	12～200			
		155～190				
		195～240				
		245～300				
		305～360				
		365～400				
		405～460				
		465～500				
		505～550				
	60	200～250	15～200			
		255～300				
		305～350				
		355～400				
		405～450				
		455～500				
		505～550				

Designate Nmin. value when no press-fit section is required. ex. D=13···▸N=5

No press-fitting section when N=T+(2 or 3).

Please designate process-fit length with N≦L−F.

■GPH−XLOC・GPH−XLOF (Press-fit diameter・length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	F 1mm increments	Press-fit diameter DK 0.001mm increments	U/Price 1～9 GPH−XLOC	U/Price 1～9 GPH−XLOF
Spiral groove fixed length GPH−XLOC Spiral groove length designation GPH−XLOF	8	30～ 50	10～ 60	GPH−XLOF F≧E+P and F≦L−N GPH−XLOC is no designation necessary for F	8.000～ 8.050	Quotation	
		55～ 80					
	10	30～ 50			10.000～10.050		
		55～ 80					
	12	30～ 50	10～ 80		12.000～12.050		
		55～ 80					
		85～120					
		125～160					
		165～200					
	13	30～ 50			13.000～13.050		
		55～ 80					
		85～120					
		125～160					
		165～200					
	16	30～ 50	13～ 80		16.000～16.050		
		55～ 80					
		85～120					
		125～160					
		165～200					
		205～250					
	20	30～ 60	13～100		20.000～20.050		
		65～110					
		115～160					
		165～200					
		205～260					
		265～300					
	25	40～ 60	13～120		25.000～25.050		
		65～110					
		115～160					
		165～200					
		205～260					
		265～300					
		305～350					
	28	50～ 60			28.000～28.050		
		65～110					
		115～160					
		165～200					
		205～260					
		265～300					
	30	50～ 60	13～130		30.000～30.050		
		65～110					
		115～160					
		165～200					
		205～260					
		265～300					
		305～350					
		355～400					
	32	50～ 60	13～130		32.000～32.050		
		65～110					
		115～160					
		165～200					
		205～260					
		265～300					
		305～350					
	35	60			35.000～35.050		
		65～110					
		115～160					
		165～200					
		205～260					
		265～300					
		305～350					
		355～400					
		405～450					
	40	80～150	15～200		40.000～40.050		
		155～190					
		195～250					
		255～300					
		305～360					
		365～400					
		405～460					
		465～500					
	50	100～150	17～200		50.000～50.050		
		155～190					
		195～250					
		255～300					
		305～360					
		365～400					
		405～460					
		465～500					
		505～550					
	60	200～250	20～200		60.000～60.050		
		255～300					
		305～360					
		365～400					
		405～460					
		465～500					
		505～550					

DK tolerance of press-fit diameter of D8～30: DK±0.002.

DK tolerance of press-fit diameter of D32～60: DK±0.003.

Please designate press-fit length with N≦L−F.

LEADER PINS WITH DIAMETER OF RECESS

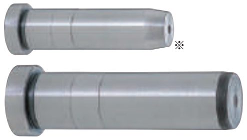
—HEAD・PLAIN PRESS-FIT LENGTH DESIGNATION TYPE・PRESS-FIT DIAMETER・LENGTH DESIGNATION TYPE—

Plain	Oil groove
Leader pins with head	Leader Bushing

Suitable

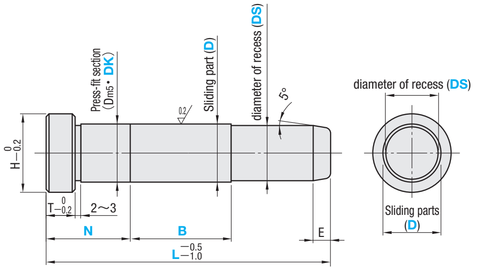
Non JIS material definition is listed on P.1351 - 1352

RoHS



※ When combination with GC

GPHOT (Press-fit length Dm5 diameter of recess designation type)
GPHOT−XL (Press-fit diameter・length diameter of recess designation type)


Press-fit section (Dm5・DK)
Sliding part (D)
diameter of recess (DS)
5°
0.2
H 0 −0.2
T 0 −0.2
2~3
N
B
E
L −0.5 −1.0
diameter of recess (DS)
Sliding parts (D)

Sliding parts D		Press-fit section Dm5 GPHOT		T	H	E
12	−0.020 −0.025	12	+0.015 +0.007	5	17	5
13		13			18	
16		16		8	21	
20	−0.025 −0.030	20	+0.017 +0.008		25	
25		25			30	
30		30			35	
40	−0.030 −0.040	40	+0.020 +0.009	10	45	8
50		50		12	55	

M SUJ2
H 58HRC~
(Induction hardening)

- By specifying the diameter of the recess, it is possible to set the clearance at the guide part to a slightly larger value than the conventional value.
- A center hole may be left on one or both ends.
- It is possible to eliminate the B dimension (sliding part) by performing alteration BN.
- By using the tip tapering (additional machining GC) as well, the effectiveness in preventing scuffing when the guide starts is improved (see photo. above).

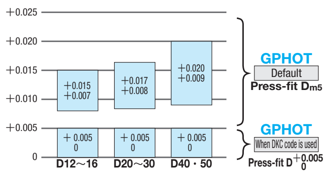
Order

Part Number	L	N	DK	B	DS
GPHOT 25	250	N100		B10	DS24.93
GPHOT−XL25	250	N100	DK25.009	B20	DS24.93

Days to Ship Quotation

Price Quotation

■Chart of press-fit tolerance GPHOT



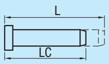
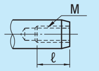
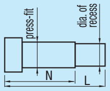
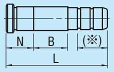
Press-fit (DK) can be designated at 0.001mm increments for GPHOT−XL

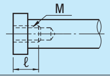
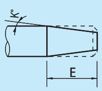
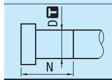
Alterations

Part Number	L(LC)	N	DK	B(BN)	DS	(MC・MMC···etc.)
GPHOT−XL 25	LC 249	N24	DK25.009	BN	DS24.93	GC−E20−K10

⊗ Combination of GC with OC not available.

Alteration details P.879~880

Alterations	Code	Spec.	1Code	
	LC	Total length alteration LC=1mm increments Shortens the full length (L) as shown in the drawing. (Tip dimension E remains unchanged.) Lmin.<LC<Lmax.		
	MC	Tip tapping D / M×Pitch / ℓ 12・13 / M 6×1.0 / 12 16 / M10×1.5 / 20 20 / M12×1.75 / 24 25~50 / M16×2.0 / 32	Quotation	
	BN	Machining to eliminate sliding part The sliding part is eliminated, so the only specifications are the diameters of the press-fit part and the recess. BN is indicated as the B dimension.		
	OC	Adds oil grooves. N+B≦L−(※) **Alteration details P.880**		

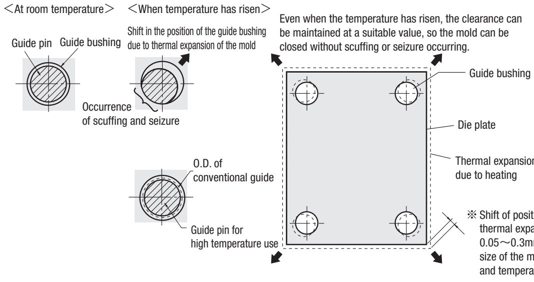
Alterations	Code	Spec.	1Code	
	MMC	Tapping on the head D / M×Pitch / ℓ 12~20 / M5×0.8 / 10 25~50 / M8×1.25 / 16		
 The tapered part is to be cut.	GC	Tapers the tip. Designation method GC−E20−K10 E=1mm increments K=1° increments 1°≦K≦10° E>20 of D16~30 is available only when L≧50. D / E 12・13 / 5≦E≦20 16 / 5≦E≦25 20 / 5≦E≦30 25 / 5≦E≦35 30 / 5≦E≦40 40・50 / 5≦E≦20 **Alteration details** when combination with MC **P.879**	Quotation	
	DKC	Changes press-fit section tolerance. $D_{m5} \rightarrow D^{+0.005}_{0}$ Available for GPHOT		

Part Number		L	N	Press-fit diameter DK		B	Diameter of recess DS		U/Price 1~9	
Type	D	5mm increments	1mm increments	0.001mm increments	Tolerance	1mm increments	0.001mm increments	Tolerance	GPHOT	GPHOT−XL
GPHOT GPHOT−XL	12	30~ 50	5~ 80	12.000~12.050	DK ±0.002	5~ 50	11.80~12.00	DS 0 −0.01	Quotation	
		55~ 80								
		85~120								
		125~160								
		165~200								
	13	30~ 50	5~ 80	13.000~13.050		5~ 50	12.80~13.00			
		55~ 80								
		85~120								
		125~160								
		165~200								
	16	30~ 50	8~ 80	16.000~16.050		5~ 50	15.80~16.00			
		55~ 80								
		85~120								
		125~160								
		165~200								
		205~250								
	20	30~ 60	8~100	20.000~20.050		5~ 80	19.80~20.00			
		65~110								
		115~160								
		165~200								
		205~260								
		265~300								
	25	40~ 60	8~120	25.000~25.050		5~130	24.80~25.00			
		65~110								
		115~160								
		165~200								
		205~260								
		265~300								
		305~350								
	30	50~ 60	8~130	30.000~30.050		5~130	29.80~30.00			
		65~110								
		115~160								
		165~200								
		205~260								
		265~300								
		305~350								
		355~400								
	40	80~140	8~130	40.000~40.050		5~130	39.80~40.00			
		145~190								
		195~240								
		245~300								
		305~380								
		385~450								
		455~500								
	50	100~150	8~140	50.000~50.050		5~140	49.80~50.00			
		155~190								
		195~240								
		245~300								
		305~360								
		365~400								
		405~460								
		465~500								
		505~550								

- L≧N+B+E
- When B=0, specify BN.
- The selection of DK is GPHOT-XL only.
- When no press-fit part is required, specify Nmin. using GPHOT. Also, the N dimension includes the head thickness and the undercut below the head, so in the case of N=T+(2or3), there is no press-fit part.

■Features

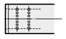
- Prevents scuffing and seizure of the guide due to fluctuation of the guide pin position and the guide bushing hole position caused by thermal expansion of the mold, and realizes appropriate opening and closing of the mold during injection molding. It is possible to use as leader pin for rubber mold.


<At room temperature>
<When temperature has risen>
Guide pin
Guide bushing
Shift in the position of the guide bushing due to thermal expansion of the mold
Occurrence of scuffing and seizure
Even when the temperature has risen, the clearance can be maintained at a suitable value, so the mold can be closed without scuffing or seizure occurring.
Guide bushing
Die plate
Thermal expansion due to heating
O.D. of conventional guide
Guide pin for high temperature use
※ Shift of position due to thermal expansion: 0.05~0.3mm (Varies with the size of the mold, type of steel, and temperature.)

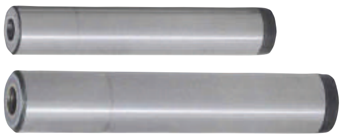
- Physical properties of metal material P.1335
- The appropriate clearance setting differs according to the size of the mold, the type of steel, the mold temperature, the guide pin diameter, etc., so select it according to the application concerned.

PRECISION LEADER PINS

— STRAIGHT・PLAIN PRESS-FIT LENGTH DESIGNATION TYPE・PRESS-FIT DIAMETER・LENGTH DESIGNATION TYPE —

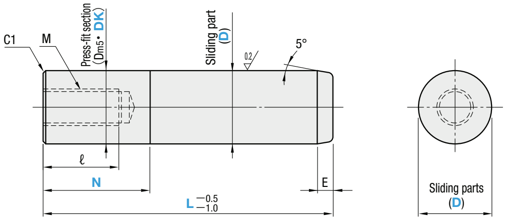
Plain	Oil groove
Suitable	
Straight leader pin	Leader Bushing

Non JIS material definition is listed on P.1351 - 1352



RoHS

GPSL (Press-fit length designation required)
GPS−XL (Press-fit diameter・length designation required)



Sliding parts D		Press-fit section Dm5 GPSL		M×Pitch	ℓ	H
8	−0.015 −0.020	8	+0.012 +0.006	M 5×0.8	10	3
10		10				4
12	−0.020 −0.025	12	+0.015 +0.007			5
13		13		M 6×1.0	12	
16		16				
20	−0.025 −0.030	20	+0.017 +0.008	M 8×1.25	16	
25		25		M12×1.75	24	
28		28				
30		30				
32	−0.030 −0.035	32	+0.020 +0.009			8
35		35		M16×2.0	32	
40	−0.030 −0.040	40				
50		50				
60	−0.030 −0.050	60	+0.024 +0.011	M20×2.5	40	

M SUJ2 H 58HRC∼(Induction hardening)

Recommended mold temperature for the usage of a precision leader pin and bushing is 80˚C or less because of a little clearance between them. (P.878)。

Order

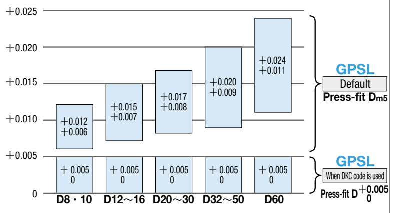
Part Number	—	L	—	N	—	DK
GPSL 32	—	180	—	N100		
GPS−XL32	—	180	—	N100	—	DK32.025

Days to Ship Quotation

Alterations

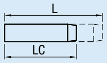
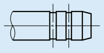
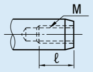
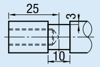
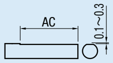
Part Number — L(LC) — N — DK — (OC・MC···etc.)
GPS−XL32 — LC 179 — N100 — DK32.025 — GC−E20−K10
⊗ Combination of GC with OC not available.

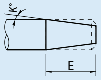
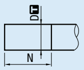
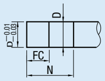
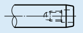
■Chart of press-fit tolerance GPSL



Press-fit (DK) can be designated at 0.001mm increments for GPS−XL

Alteration details P.879・880

Alterations	Code	Spec.	1Code
	LC	Total length alteration LC=1mm increments Shortens the full length (L) as shown in the drawing. (Tip dimension E remains unchanged.) Lmin.<LC<Lmax.	
	OC	Adds oil grooves. Please note that the designation range of N dimension is changed. **Alteration details P.880**	
	MC	Tip tapping ⊗ D=Not available for 8 and 10. D / M×Pitch / ℓ 12・13 / M 6×1.0 / 12 16 / M10×1.5 / 20 20 / M12×1.75 / 24 25∼60 / M16×2.0 / 32	Quotation
	YC	Adds a stopper groove. Use this alteration when a tap cannot be used. ⊗ D=Not available for 8∼12.	
	AC	Groove processing for air relief Designation method AC124 AC=1mm increments 10≦AC≦L−(N+5)	

Alterations	Code	Spec.	1Code
 The tapered part is to be cut.	GC	Tapers the tip. Designation method GC−E20−K10 E=1mm increments K=1˚ increments 1˚≦K≦10˚ E>20 of D16∼30 is available only when L≧50. D / E 8・10 / 5≦E≦15 12・13 / 5≦E≦20 16 / 5≦E≦25 20 / 5≦E≦30 25・28 / 5≦E≦35 30 / 5≦E≦40 32∼60 / 5≦E≦20 **Alteration details** when combination with MC **P.879**	
	DKC	Changes press-fit section tolerance. Dm5 ···› D +0.005 0 Available for GPSL	Quotation
	FC	Introduction recess processing Adds an introduction recess processing on the press-fit section. FC=1mm increments 3≦FC≦N−10 Recess processing sectionD −0.01 −0.03	
	GA	Adds a tap to attach a leader assist pin. Available for D40/50/60. **Alteration details P.879**	

Price Quotation

■GPSL (Press-fit length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	U/Price 1∼9
GPSL	8	40∼ 70	0∼ 40	Quotation
	10	40∼ 70		
	12	40∼110	0∼100	
		115∼160		
	13	40∼110		
		115∼160		
		165∼200		
	16	40∼110		
		115∼160		
		165∼200		
	20	40∼110		
		115∼160		
		165∼220		
	25	50∼110		
		115∼160		
		165∼200		
		205∼260		
	28	60∼100		
		105∼160		
		165∼200		
		205∼260		
	30	70∼100		
		105∼160		
		165∼200		
		205∼260		
GPSL	32	70∼100	0∼120	Quotation
		105∼160		
		165∼200		
		205∼260		
	35	100∼140		
		145∼190		
		195∼240		
		245∼300		
	40	100∼140	0∼140	
		145∼190		
		195∼240		
		245∼300		
	50	100∼150	0∼200	
		155∼190		
		195∼240		
		245∼300		
		305∼360		
		365∼400		
	60	150∼190		
		195∼240		
		245∼300		
		305∼360		
		365∼400		
		405∼450		
		455∼500		

Designate N=0 for GPSL, when no press-fit part is required.
Please designate process-fit length with N≦L−E.

■GPS−XL (Press-fit diameter・length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	Press-fit diameter DK 0.001mm increments	U/Price 1∼9
GPS−XL	8	40∼ 70	5∼ 40	8.000∼ 8.050	Quotation
	10	40∼ 70		10.000∼10.050	
	12	40∼110	5∼100	12.000∼12.050	
		115∼160			
	13	40∼110		13.000∼13.050	
		115∼160			
		165∼200			
	16	40∼110		16.000∼16.050	
		115∼160			
		165∼200			
	20	40∼110		20.000∼20.050	
		115∼160			
		165∼220			
	25	50∼110		25.000∼25.050	
		115∼160			
		165∼200			
		205∼260			
	28	60∼110		28.000∼28.050	
		115∼160			
		165∼200			
		205∼260			
	30	70∼110		30.000∼30.050	
		115∼160			
		165∼200			
		205∼260			
GPS−XL	32	70∼110	5∼120	32.000∼32.050	Quotation
		115∼160			
		165∼200			
		205∼260			
	35	100∼150		35.000∼35.050	
		155∼190			
		195∼240			
		245∼300			
	40	100∼150	5∼140	40.000∼40.050	
		155∼190			
		195∼240			
		245∼300			
	50	100∼150	5∼200	50.000∼50.050	
		155∼190			
		195∼240			
		245∼300			
		305∼360			
		365∼400			
	60	150∼190		60.000∼60.050	
		195∼240			
		245∼300			
		305∼360			
		365∼400			
		405∼450			
		455∼500			

DK tolerance of press-fit diameter of D8∼30: DK±0.002.
Please designate process-fit length with N≦L−E.

DK tolerance of press-fit diameter of D32∼60: DK±0.003.

Example P.898

PRECISION LEADER PINS

—STRAIGHT・OIL GROOVE PRESS-FIT LENGTH DESIGNATION TYPE—

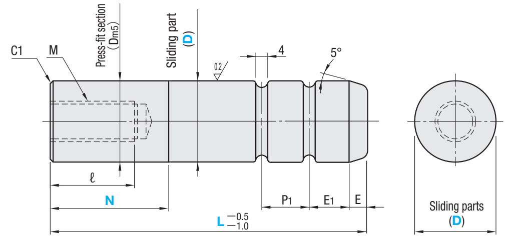
Oil groove	Plain
Straight leader pin	Leader Bushing

Suitable

Non JIS material definition is listed on P.1351 - 1352

RoHS

GPOL (Press-fit length designation type)



Sliding parts D		Press-fit section Dm5		M×Pitch	ℓ	E
35	−0.030 −0.035	35	+0.020 +0.009	M16×2.0	32	8
40	−0.030 −0.040	40				
50		50				
60	−0.030 −0.050	60	+0.024 +0.011	M20×2.5	40	

Recommended mold temperature for the usage of a precision leader pin and bushing is 80°C or less because of a little clearance between them. (P.878)

M SUJ2
H 58HRC～
(Induction hardening)

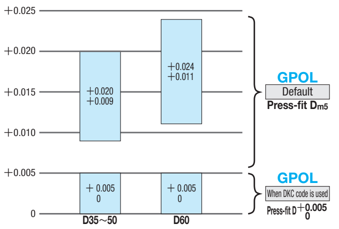
Order

Part Number	—	L	—	N
GPOL40	—	150	—	N60

Days to Ship Quotation

Price Quotation

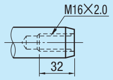
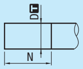
■Chart of press-fit tolerance GPOL

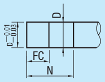
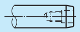


Alterations

Part Number	—	L	—	N	— (MC・DKC・・・etc.)
GPOL50	—	150	—	N70	— DKC

Alteration details P.879

Alterations	Code	Spec.	1Code
	MC	Tip tapping	Quotation
	DKC	Changes press-fit section tolerance. Dm5 ···› D $^{+0.005}_{0}$	

Alterations	Code	Spec.	1Code
	FC	Introduction recess processing Adds an introduction recess processing on the press-fit section. FC=1mm increments 3≦FC≦N−10 Recess processing section D $^{-0.01}_{-0.03}$	Quotation
	GA	Adds a tap to attach a leader assist pin. Available for D40・50・60 **Alteration detail** P.879	

E1	P1	Number of groove	Part Number Type	D	L Selection	N 1mm increments	U/Price 1～9
14	12	2	GPOL	35	100	0～ 60	Quotation
15	13				110 120 130		
					140	0～ 80	
					150 160		
16	14				170 180 190		
					200		
26	24			40	130 140	0～ 60	
28	26				150 160 170 180 190	0～ 80	
30	28				200 210 220		
28	26			50	150	0～ 80	
30	28				160 170		
					180 190	0～100	
32	30				200 210 220 230 240		
34	32				250 260		
30	28			60	200 210 220 230 240	0～120	
32	30				250 260 270 280		

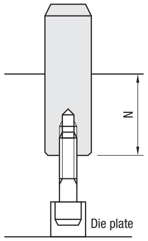
In the case where a press-fit part is not necessary, specify N=0.

- When you wish to freely specify the overall length (L dimension) and diameter of the press-fit part, order using GPSL and GPS-XL. (P.895)

ex Example

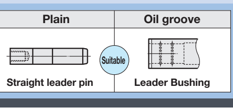
■Method of installing the straight leader pin

- When the die plate is very thick, the straight type can be set as shown in the drawing, enabling machining to be performed easily. Specify the N dimension to match the thrust.



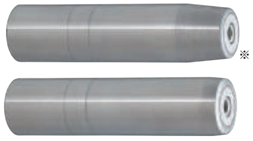
LEADER PINS WITH DIAMETER OF RECESS
—STRAIGHT・PLAIN PRESS-FIT LENGTH DESIGNATION TYPE—

Plain		Oil groove
Straight leader pin	Suitable	Leader Bushing



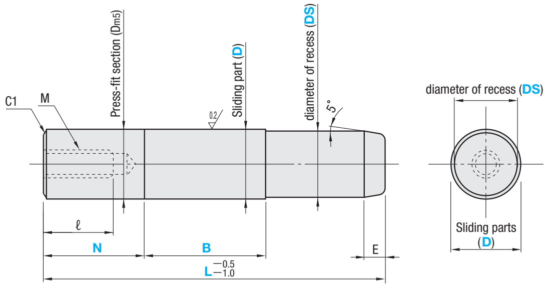
Non JIS material definition is listed on P.1351 - 1352

RoHS



※When combination with GC

GPSOT (Press-fit length diameter of recess designation type)


Press-fit section (D_{m5})
Sliding part (D)
diameter of recess (DS)
C1
M
0.2
5°
ℓ
N
B
E
L $^{-0.5}_{-1.0}$
diameter of recess (DS)
Sliding parts (D)

Sliding parts D		Press-fit section D_{m5}		M×Pitch	ℓ	E
16	−0.020 −0.025	16	+0.015 +0.007	M 6×1.0	12	5
20	−0.025 −0.030	20	+0.017 +0.008	M 8×1.25	16	
25		25		M12×1.75	24	
30		30				

M SUJ2
H 58HRC～
(Induction hardening)

- By specifying the diameter of the recess, it is possible to set the clearance at the guide part to a slightly larger value than the conventional value.
- A center hole may be left on one or both ends.
- It is possible to eliminate the B dimension (sliding part) by performing alteration BN.
- By using the tip tapering (additional machining GC) as well, the effectiveness in preventing scuffing when the guide starts is improved (see photo. above).

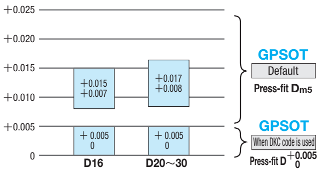
Order

Part Number	—	L	—	N	—	B	—	DS
GPSOT30	—	200	—	N100	—	B10	—	DS29.80

Days to Ship Quotation

Price Quotation

■Chart of press-fit tolerance GPSOT

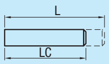
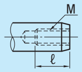
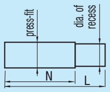
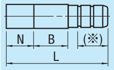


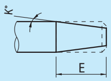
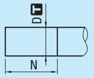
Alterations

Part Number	—	L(LC)	—	N	—	B(BN)	—	DS	—	(MC・OC…etc.)
GPSOT25	—	LC 168	—	N24	—	BN	—	DS24.93	—	GC—E20—K10

⊗ Combination of GC with OC not available.

Alteration details P.879

Alterations	Code	Spec.	1Code
	LC	Total length alteration LC=1mm increments Shortens the full length (L) as shown in the drawing. (Tip dimension E remains unchanged.) Lmin.<LC<Lmax.	Quotation
	MC	Tip tapping D / M×Pitch / ℓ 16 / M10×1.5 / 20 20 / M12×1.75 / 24 25, 30 / M16×2.0 / 32	
	BN	Machining to eliminate sliding part The sliding part is eliminated, so the only specifications are the diameters of the press-fit part and the recess. BN is indicated as the B dimension.	
	OC	Adds oil grooves. N+B≦L−(※) Alteration details P.879	

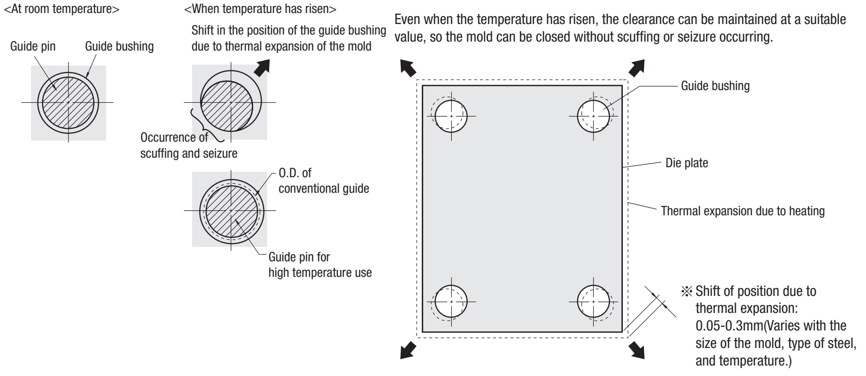
Alterations	Code	Spec.	1Code
 The tapered part is to be cut.	GC	Tapers the tip. Designation method GC—E20—K10 E=1mm increments K=1° increments 1°≦K≦10° E>20 is available only when L≧50. D / E 16 / 5≦E≦25 20 / 5≦E≦30 25 / 5≦E≦35 30 / 5≦E≦40 Alteration details when combination with MC P.879	Quotation
	DKC	Changes press-fit section tolerance. D_{m5} ⋯› D $^{+0.005}_{0}$	

Part Number		L	N	B	Diameter of recess DS		U/Price
Type	D	5mm increments	1mm increments	1mm increments	0.01mm increments	Tolerance	1～9
GPSOT	16	40～ 50	0～100	5～ 50	15.80～16.00	0 −0.01	Quotation
		55～ 80					
		85～120					
		125～160					
		165～200					
	20	40～ 60	0～100	5～ 80	19.80～20.00		
		65～110					
		115～160					
		165～220					
	25	50～ 60	0～100	5～130	24.80～25.00		
		65～110					
		115～160					
		165～200					
		205～260					
	30	70～110	0～100	5～130	29.80～30.00		
		115～160					
		165～200					
		205～260					

- L≧N+B+E
- When B=0, specify BN.
- In the case where a press-fit part is not necessary, specify N=0.

■Features

- Prevents scuffing and seizure of the guide due to fluctuation of the guide pin position and the guide bushing hole position caused by thermal expansion of the mold, and realizes appropriate opening and closing of the mold during injection molding. It is possible to use as leader pin for rubber mold.


<At room temperature>
Guide pin
Guide bushing
<When temperature has risen>
Shift in the position of the guide bushing due to thermal expansion of the mold
Occurrence of scuffing and seizure
O.D. of conventional guide
Guide pin for high temperature use
Guide bushing
Die plate
Thermal expansion due to heating

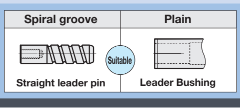
Even when the temperature has risen, the clearance can be maintained at a suitable value, so the mold can be closed without scuffing or seizure occurring.

※Shift of position due to thermal expansion: 0.05-0.3mm(Varies with the size of the mold, type of steel, and temperature.)

- Physical properties of metal material P.1335
- The appropriate clearance setting differs according to the size of the mold, the type of steel, the mold temperature, the guide pin diameter, etc., so select it according to the application concerned.

PRECISION LEADER PINS WITH SPIRAL VENT

—STRAIGHT・SPIRAL GROOVE PRESS-FIT LENGTH DESIGNATION TYPE・PRESS-FIT DIAMETER・LENGTH DESIGNATION TYPE—



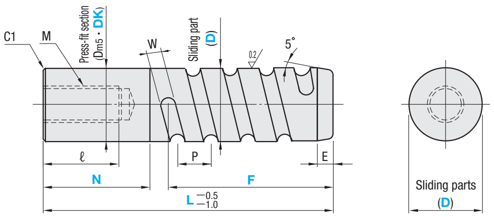
Non JIS material definition is listed on P.1351 - 1352

RoHS

GPSLOC (Press-fit diameter Dm5・length designation・spiral groove fixed length)
GPSLOF (Press-fit diameter Dm5・length designation・spiral groove length designation)
GPS−XLOC (Press-fit diameter DK designation・length designation・spiral groove fixed length)
GPS−XLOF (Press-fit diameter DK designation・length designation・spiral groove length designation)

Sliding parts D		Press-fit section D_{m5} GPSLOC GPSLOF		M×Pitch	ℓ	E	W
8	−0.015 −0.020	8	+0.012 +0.006	M 5×0.8	10	3	2
10		10				4	
12	−0.020 −0.025	12	+0.015 +0.007			5	3
13		13		M 6×1.0	12		
16		16					
20	−0.025 −0.030	20	+0.017 +0.008	M 8×1.25	16		
25		25		M12×1.75	24		
28		28					
30		30					
32	−0.030 −0.035	32	+0.020 +0.009			8	
35		35		M16×2.0	32		
40	−0.030 −0.040	40					
50		50					
60	−0.030 −0.050	60	+0.024 +0.011	M20×2.5	40		

L	P	F dimension GPSLOC・GPS-XLOC
40～ 70	10	When $L-N>\frac{L}{2}$ $F=\frac{L}{2}$ When $L-N\leqq\frac{L}{2}$ $F=L-(N+10)$
75～120	15	
125～180	20	
185～300	25	
305～500	30	



- Recommended mold temperature for the usage of a precision leader pin and bushing is 80˚C or less because of a little clearance between them. (P.878)
- Oil groove part might not be colored by heat treatment. Despite appearance differences, it can be used without any problem.

M SUJ2 H 58HRC～(Induction hardening)

Order

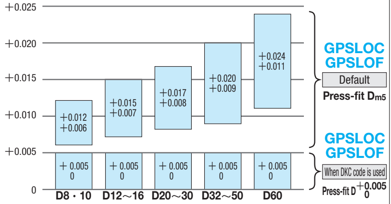
Part Number	L	N	F	DK
GPSLOC 32	180	N100		
GPS−XLOF32	180	N100	F75	DK32.025

Days to Ship Quotation

Alterations

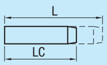
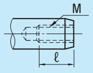
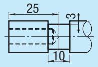
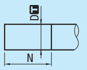
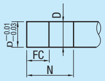
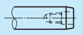
Part Number	L(LC)	N	F	DK	(MC···etc.)
GPS−XLOF32	LC 179	N100	F75	DK32.025	MC

■Chart of press-fit tolerance GPSLOC GPSLOF



- Press-fit (DK) can be designated at 0.001mm increments for GPS−XLOC・GPS−XLOF.

Alteration details P.879・880

Alterations	Code	Spec.	1Code
	LC	Total length alteration LC=1mm increments Shortens the full length (L) as shown in the drawing. (Tip dimension E remains unchanged.) Lmin.＜LC＜Lmax.	Quotation
	MC	Tip tapping ⊗ D=Not available for 8 and 10. D M×Pitch ℓ 12・13 M 6×1.0 12 16 M10×1.5 20 20 M12×1.75 24 25～60 M16×2.0 32	
	YC	Adds a stopper groove. Use this alteration when a tap cannot be used. ⊗ D=Not available for 8～12.	
	DKC	Changes press-fit section tolerance. D_{m5} ···→ $D^{+0.005}_{0}$ Available for GPSLOC, GPSLOF	Quotation
	FC	Introduction recess processing Adds an introduction recess processing on the press-fit section. FC=1mm increments 3≦FC≦N−10 Recess processing sectionD $^{-0.01}_{-0.03}$	
	GA	Adds a tap to attach a leader assist pin. Available for D40/50/60. **Alteration details P.879**	

Price Quotation

■GPSLOC・GPSLOF (Press-fit length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	F 1mm increments	U/Price 1～9 GPSLOC	U/Price 1～9 GPSLOF
Spiral groove fixed length GPSLOC Spiral groove length designation GPSLOF	8	40～ 70	0～ 40	GPSLOF F≧E+P and F≦L−N GPSLOC is no designation necessary for F	Quotation	
	10	40～ 70				
	12	40～110	0～100			
		115～160				
	13	40～110				
		115～160				
		165～200				
	16	40～110				
		115～160				
		165～200				
	20	40～110				
		115～160				
		165～220				
	25	50～110				
		115～160				
		165～200				
		205～260				
	28	60～100				
		105～160				
		165～200				
		205～260				
	30	70～100				
		105～160				
		165～200				
		205～260				
Spiral groove fixed length GPSLOC Spiral groove length designation GPSLOF	32	70～100	0～120	GPSLOF F≧E+P and F≦L−N GPSLOC is no designation necessary for F	Quotation	
		105～160				
		165～200				
		205～260				
	35	100～140				
		145～190				
		195～240				
		245～300				
	40	100～140	0～140			
		145～190				
		195～240				
		245～300				
	50	100～150	0～200			
		155～190				
		195～240				
		245～300				
		305～360				
		365～400				
	60	150～190				
		195～240				
		245～300				
		305～360				
		365～400				
		405～450				
		455～500				

- Designate N=0 for GPSLOC・GPSLOF, when no press-fit part is required.
- Please designate process-fit length with N≦L−F.

■GPS−XLOC・GPS−XLOF (Press-fit diameter・length designation type)

Part Number Type	D	L 5mm increments	N 1mm increments	F 1mm increments	Press-fit diameter DK 0.001mm inc.	U/Price 1～9 GPS−XLOC	U/Price 1～9 GPS−XLOF
Spiral groove fixed length GPS−XLOC Spiral groove length designation GPS−XLOF	8	40～ 70	5～ 40	GPS−XLOF F≧E+P and F≦L−N GPS-XLOC is no designation necessary for F	8.000～ 8.050	Quotation	
	10	40～ 70			10.000～10.050		
	12	40～110	5～100		12.000～12.050		
		115～160					
	13	40～110			13.000～13.050		
		115～160					
		165～200					
	16	40～110			16.000～16.050		
		115～160					
		165～200					
	20	40～110			20.000～20.050		
		115～160					
		165～220					
	25	50～110			25.000～25.050		
		115～160					
		165～200					
		205～260					
	28	60～110			28.000～28.050		
		115～160					
		165～200					
		205～260					
	30	70～110			30.000～30.050		
		115～160					
		165～200					
		205～260					
Spiral groove fixed length GPS−XLOC Spiral groove length designation GPS−XLOF	32	70～110	5～120	GPS−XLOF F≧E+P and F≦L−N GPS-XLOC is no designation necessary for F	32.000～32.050	Quotation	
		115～160					
		165～200					
		205～260					
	35	100～150			35.000～35.050		
		155～190					
		195～240					
		245～300					
	40	100～150	5～140		40.000～40.050		
		155～190					
		195～240					
		245～300					
	50	100～150	5～200		50.000～50.050		
		155～190					
		195～240					
		245～300					
		305～360					
		365～400					
	60	150～190			60.000～60.050		
		195～240					
		245～300					
		305～360					
		365～400					
		405～450					
		455～500					

- DK tolerance of press-fit diameter of D8～30: DK±0.002.
- Please designate process-fit length with N≦L−F.
- DK tolerance of press-fit diameter of D32～60: DK±0.003.

LEADER PINS FOR MIDDLE · LARGE MOLD

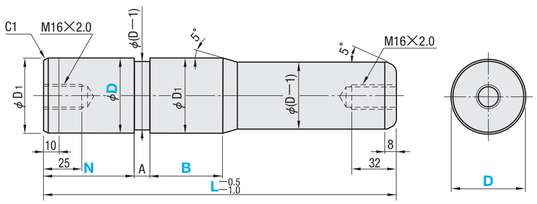
—L · N · B DIMENSION DESIGNATION · SHAFT DIAMETER TOLERANCE SELECTION TYPE—

ASSIST PINS FOR LEADER PIN

Non JIS material definition is listed on P.1351 - 1352

RoHS

GPX
GPP



Type	D	D(h6)	D1(f6)
GPX	40	0 −0.016	−0.025 −0.041
	50		
	60	0 −0.019	−0.030 −0.049
	80		

Type	D	D	D1(e7)
GPP	40	±0.015	−0.050 −0.075
	50		−0.060 −0.090
	60		
	80		

M S50C　H 58HRC～ (Induction hardening)

A	Part Number		L	1mm increments		U/Price
	Type	D	5mm increments	N	B	1～9
10	GPX GPP	40	100～145	N=0 or 5≦N≦140	B=0 or 5≦B≦200	Quotation
			150～195			
			200～240			
			245～300			
			305～360			
		50	100～145	N=0 or 5≦N≦200		
			150～195			
			200～240			
			245～300			
			305～360			
			365～400			
20		60	150～195			
			200～240			
			245～300			
			305～360			
			365～400			
			405～450			
			455～500			
		80	150～195			
			200～240			
			245～300			
			305～360			
			365～400			

Designate N=0 when no press-fit section is required

Order

Part Number	—	L	—	N	—	B
GPX40	—	250	—	N100	—	B50

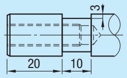
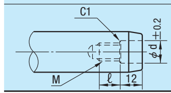
Price Quotation

Days to Ship Quotation

Alterations

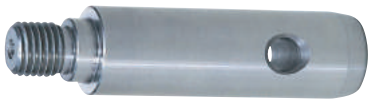
Part Number	—	L	—	N	—	B	—	(YC · GA)
GPX40	—	250	—	N100	—	B50	—	YC

Alteration details P.879

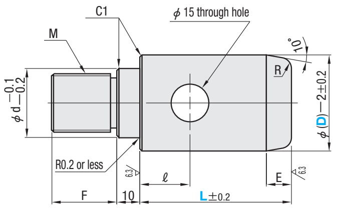
Alterations	Code	Spec.	1Code
	YC	Adds a stopper groove. Use this alteration when a tap cannot be used.	Quotation
	GA	Adds a tap to attach a leader assist pin. Adds a tap to attach a leader assist pin (GAP). ※M: Coarse thread	

D	M	ℓ	φd
40	24	30	29
50	30	35	36
60			
80	36	45	41

RoHS



GAP



M S45C

R	ℓ	E	d	F	M (Coarse thread)	Part Number		L	U/Price
						Type	D	5mm increments	1～9
5	40	10	28	25	M24	GAP	40	60～100	Quotation
	85							105～150	
	135							155～200	
	55	12	35	30	M30		50	80～150	
	130							155～200	
	180							205～250	
8	70						60	100～150	
	125							155～200	
	175							205～250	
10	85	15	40	40	M36		80	120～150	
	120							155～200	
	170							205～250	
	220							255～300	

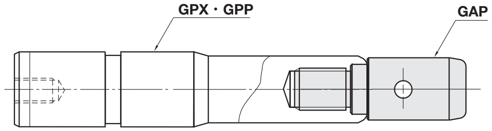
Order

Part Number	—	L
GAP40	—	120

Price Quotation

Days to Ship Quotation

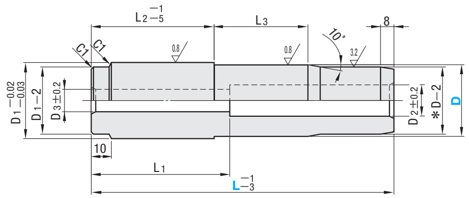
Example
- ■Makes it possible to extend the leader pin length. (Add GA alteration to the leader pin.)
- ■Available also for D40 or larger of GPHL/GPJL/GPSL.



STRAIGHT LEADER PINS FOR MIDDLE · LARGE MOLD

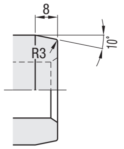
—BOLT TYPE—

RoHS **GPPTA** (Bolt type)



L2 −1 −5
L3
8
10°
C1
C1
0.8
0.8
3.2
D1 −0.02 −0.03
D1 −2
D3 ±0.2
D2 ±0.2
∗D−2
D
10
L1
L −1 −3

● Details of the tip



* ∗D−2 area is not quenched.

M S55C
H 5~65HRC (Induction hardening)
A Fixing bolt (CB) ×1

D tolerance		D1	D2	D3	L1	L2	L3	**A** Supplied bolts	Part Number		L	U/Price
									Type	D	10mm increments	1~9
40	−0.04 −0.05	40	17	11	95	80	70	CB10−120	GPPTA	40	160~210	Quotation
50	−0.06 −0.07	50	20	14	120	100	80	CB12−150		50	190~260	
60	−0.07 −0.08	60	26	18	145	120	100	CB16−170		60	230~270 280~320	
80	−0.08 −0.10	80	32	22	200	160	120	CB20−230		80	290~340 350~400	

Order

Part Number	—	L
GPPTA 50	—	200

Days to Ship Quotation

Price Quotation

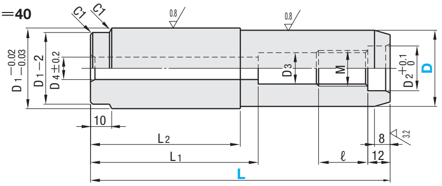
STRAIGHT LEADER PINS FOR MIDDLE · LARGE MOLD/ASSIST PINS

—JOINT TYPE—

Non JIS material definition is listed on P.1351 - 1352

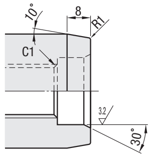
RoHS **GPPTB** (Joint type)

D=40



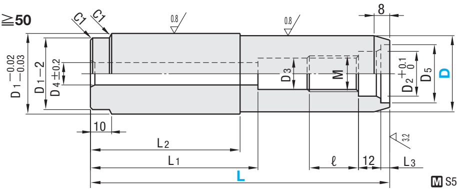
C1
C1
0.8
0.8
D1 −0.02 −0.03
D1 −2
D4 ±0.2
D3
M
D2 +0.1 0
D
10
L2
L1
L
8
3.2
ℓ
12

● Details of the tip



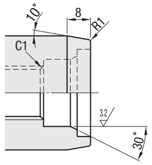
10°
8
R1
C1
3.2
30°

D≧50



8
C1
C1
0.8
0.8
D1 −0.02 −0.03
D1 −2
D4 ±0.2
D3
M
D2 +0.1 0
D5
D
10
L2
L1
L
ℓ
12
L3
3.2

● Details of the tip

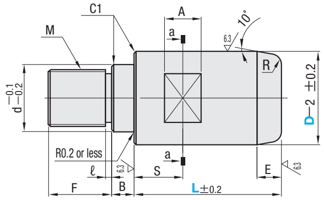


10°
8
R1
C1
3.2
30°

M S55C
H 55~65HRC (Induction hardening)
A Fixing bolt (CB) M1×1

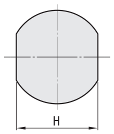
D tolerance		D1	D2	D3	D4	D5	L1	L2	L3	M	ℓ	**A** Supplied bolts	Part Number		L	U/Price
													Type	D		1~9
40	−0.04 −0.05	40	22	17.7	11	—	95	80	—	M20	24	CB10−120	GPPTB	40	160	Quotation
50	−0.06 −0.07	50	27	21.2	14	41	120	100	6	M24	28	CB12−150		50	190	
60	−0.07 −0.08	60	33	26.6	18	51	145	120	7.5	M30	33	CB16−170		60	230	
80	−0.08 −0.10	80	40	32	22	64	200	160	8.5	M36	43	CB20−230		80	290	

■Assist Pins for Leader Pin **RoHS** **GAPT**



C1
M
A
a
10°
6.3
R
d −0.1 −0.2
D−2 ±0.2
R0.2 or less
a
ℓ
6.3
B
S
E
6.3
F
L±0.2

● SEC.a-a



● **A** Spring washer dimensions

Size	Internal dia.	External dia.	Thickness
For M22	22.5	32.9	4.5
For M27	27.5	40.0	5.5
For M33	33.5	50.0	7.0
For M42	42.7	63.0	8.0

M S45C
A Spring washer

d	B	M	F	E	ℓ	H	S	R	A	**A** Spring washer	Part Number		L	U/Price 1~9				
											Type	D	10mm increments	L60~100	L110~150	L160~200	L210~250	L260~300
22	14	M20	20	10	4	32	15	5	25	For M22	GAPT	40	60~200	Quotation				
27	16	M24	28	12	5	41	20		30	For M27		50	80~250					
33	18	M30	30			50	25	8		For M33		60	100~250					
40		M36	40	15		70	30	10	35	For M42		80	120~300					

Specifications of the supplied spring washers correspond to the d size.
Use GAPT in conjunction with GPPTB.

Order

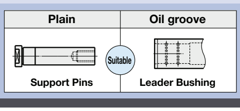
Part Number	—	L
GPPTB60	—	230
GAPT 40	—	120

Days to Ship Quotation

Price Quotation

SUPPORT PINS

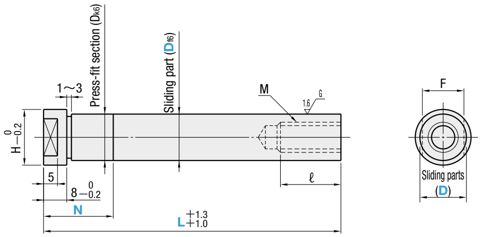
—PLAIN TYPE—

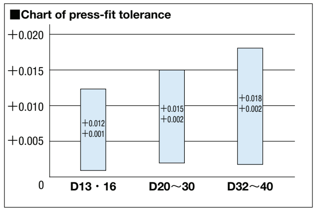


RoHS

Type	Part Number	M	H
Press-fit length designation	SPP	SUJ2	58HRC~ Induction hardening

- There may be a center hole on the end.
- Designate N=8 when no press-fit section is required.




■Chart of press-fit tolerance

Sliding parts Df6		Press-fit section Dk6		F	H	M (Coarse thread)		Part Number		L	N	U/Price
						M×Pitch	ℓ	Type	D	5mm increments	1mm increments	1~9
13	−0.016 −0.027	13	+0.012 +0.001	12	16	M 6×1.0	12	SPP (Press-fit Dk6)	13	60~ 90 95~120	8~60	Quotation
16		16		14	19	M10×1.5	20		16	80~110 115~150 155~180 185~210		
20	−0.020 −0.033	20	+0.015 +0.002	19	23	M12×1.75	24		20	90~130 135~170 175~210 215~250 255~300		
25		25		22	28	M16×2.0	32		25	100~140 145~190 195~250 255~300		
28		28		27	31				28	100~150 155~200 205~250 255~300		
30		30		29	35				30	150~200 205~250 255~300 305~350		
32	−0.025 −0.041	32	+0.018 +0.002	30	35				32	150~200 205~250 255~300 305~350		
35		35		32	40				35	150~200 205~250 255~300 305~350		
36		36		36	41				36	150~200 205~250 255~300 305~350		
40		40			45				40	150~200 205~250 255~300 305~350		

Order

Part Number	—	L	—	N
SPP25	—	190	—	N50

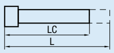
Days to Ship Quotation

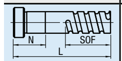
Price Quotation

Alterations

Part Number	—	L(LC)	—	N	— (SOF)
SPP25	—	LC152	—	N50	

Pay attention to the production time.

Alteration	Code	Spec.	1Code
	LC	Changes the full length. LC=1mm increments Lmin.<LC<Lmax. The tap depth becomes shorter by (standard L-LC) since this alteration cuts a standard length piece (5mm increments).	Quotation

Alteration	Code	Spec.	1Code
	SOF	Spiral groove processing (designation) SOF=1mm increments L−N≧SOF **Alteration details** P.880	Quotation

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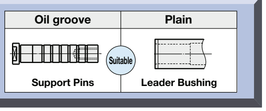
SUPPORT PINS

—OIL GROOVE TYPE—

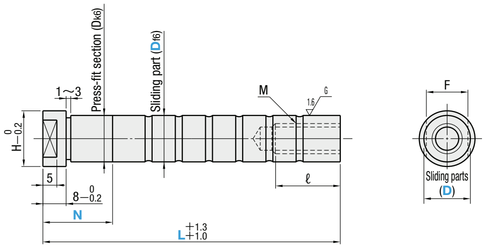


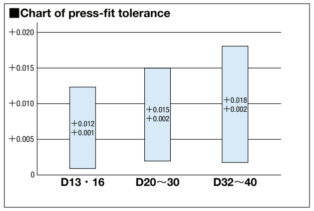
Non JIS material definition is listed on P.1351 - 1352

RoHS

Type	Part Number	M	H
Press-fit length designation	SPP—OC	SUJ2	58HRC~ Induction hardening

- Oil grooves P.909
- Oil groove part might not be colored by heat treatment.
- There may be a center hole on the end.
- DesignateN=8 when press-fit processing is not required.




■Chart of press-fit tolerance

Sliding parts Df6		Press-fit section Dk6		F	H	M (Coarse thread)		Part Number		L	N	U/Price
						M×Pitch	ℓ	Type	D	5mm increments	1mm increments	1~9
13	−0.016 −0.027	13	+0.012 +0.001	12	16	M 6×1.0	12	SPP—OC (Press-fit Dk6)	13	60~ 90 95~120	8~30	Quotation
16		16		14	19	M10×1.5	20		16	80~ 90 95~120 125~150 155~180 185~210		
20	−0.020 −0.033	20	+0.015 +0.002	19	23	M12×1.75	24		20	90 95~120 125~150 155~180 185~210 215~250 255~300		
25		25		22	28	M16×2.0	32		25	100~120 125~150 155~180 185~210 215~250 255~300	8~40	
28		28		27	31				28	100~120 125~150 155~180 185~210 215~250 255~300	8~50	
30		30		29	35				30	150~200 205~250 255~300 305~350		
32	−0.025 −0.041	32	+0.018 +0.002	30	35				32	150~200 205~250 255~300 305~350		
35		35		32	40				35	150~200 205~250 255~300 305~350		
36		36		36	41				36	150~200 205~250 255~300 305~350		
40		40			45				40	150~200 205~250 255~300 305~350	8~60	

Order

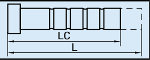
Part Number	—	L	—	N
SPP—OC25	—	190	—	N30

Days to Ship Quotation

Price Quotation

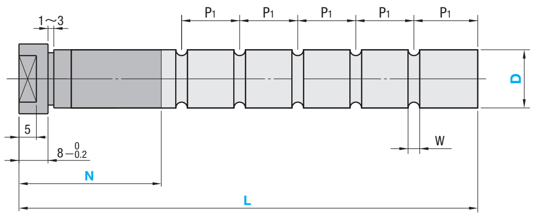
Alterations

Part Number	—	L(LC)	—	N
SPP—OC25	—	LC152	—	N30

Alteration	Code	Spec.	1Code
	LC	Changes the full length. LC=1mm increments Lmin.<LC<Lmax. The tap depth becomes shorter by (standard L-LC) since this alteration cuts a standard length piece (5mm increments).	Quotation

SUPPORT PINS
—OIL GROOVE TYPE OIL GROOVE PROCESSING GUIDE— ／ —EXAMPLE—

■Support Pins —Oil groove type— Oil groove processing guide



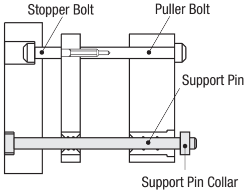
Adds an oil groove

An oil groove with W width is processed at first on the position (N＋10), followed by further grooves being processed at P_1 intervals to E_1.

Nmax.: Maximum Value of press-fit length
P_1 : Interval of oil groove
W : Oil groove width

D	Nmax.	P_1	W
13・16	30	20	3
20		25	
25	40		
28・30	50	30	
32・35・36		35	5
40	60		

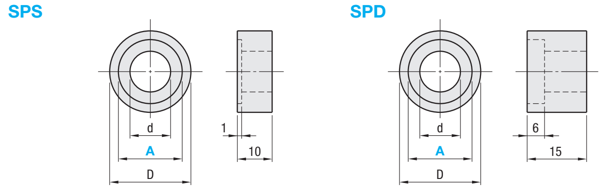
Example



Receiving the weight of a die plate on their tips, support pins may deflect due to a large amount of bending moment and eventually break due to resulting cracks. Usage of leader bushing is recommended.

SUPPORT PIN COLLARS

Non JIS material definition is listed on P.1351 - 1352



M S45C
H 34~43HRC **S** Black Oxide

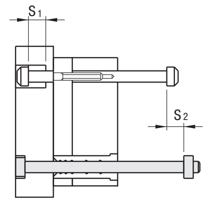
Applicable support pins (D)	D	d	Part Number		SPS				SPD			
					U/Price				U/Price			
			Type	A	1~9	10~29	30~99	100~200	1~9	10~29	30~99	100~200
13	18	6.5	SPS SPD	13	Quotation							
16	21	10.5		16								
20	25	12.5		20								
25	30	16.5		25								
28	33			28								
30	35			30								
32	37			32								
35	40			35								
36	41			36								
40	45			40								

To be quoted on price & lead time above Max. Q'ty.

Order **Part Number**
SPS16

Days to Ship Quotation

Example



Use the support pin collars to prevent from such accidents as puller bolt or stopper bolt breakage. Use a support pin in accordance with the S_2 amount in left figure.

- Although a stopper bolt is sufficient to control the stroke amount (S) of a runner stripper plate ($S_2 > S_1$), we recommend that you use a support collar as a guard for the underhead of the support pin.

PRECISION LEADER BUSHINGS

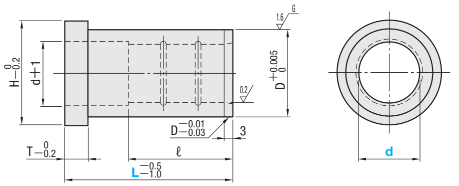
—HEAD TYPE WITH OIL GROOVE—

Plain	Oil groove
Leader pins・Support pins	Leader bushings with head

Suitable

RoHS

GBH



Set mold temperature to 80˚C generally since the clearance is small when the precision leader bushing is used in combination with the precision leader pin or precision support pin. (**P.878**)

M SUJ2
H 58HRC∼

d		T	D	H	ℓ														
					L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120
8	0 −0.005	5	12	14	15	15	15	—	—	—	—	—	—	—	—	—	—	—	—
10			14	16	15	20	20	20	20	20									
12	−0.005 −0.010		18	22	15	20	25	25	25	25	25	25							
13			20	25	15	20	25	25	25	25	25	25							
16		6	25	30	—	20	25	30	35	30	30	30	30						
20	−0.010 −0.015	8	30	35		20	25	30	35	40	40	40	40	40					
25			35	40		—	25	30	35	40	45	50	50	50	50				
28			40	45			—	—	—	—	—	50	56	—	56				
30			42	47			25	30	35	40	50	50	60	60	60	60	60		
35	−0.015 −0.020		48	54			—	—	35	40	—	50	60	70	70	70	70	70	70
40		10	55	60					—	—		50	60	70	80	80	80	80	80

Part Number		U/Price 1∼9														
Type	d	L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120
GBH	8				—	—	—	—	—	—	—	—	—	—	—	—
	10															
	12															
	13															
	16	—														
	20															
	25		—													
	28			—	—	—	—	—			—					
	30															
	35			—	—			—								
	40					—	—									

Quotation

Order

Part Number — L
GBH25 — 60

Days to Ship Quotation

Price Quotation

PRECISION LEADER BUSHINGS

—STRAIGHT TYPE WITH OIL GROOVE—

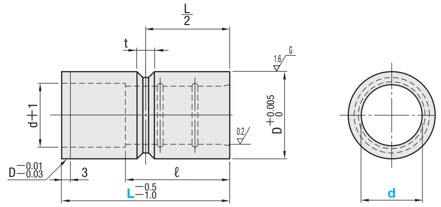
Plain	Oil groove
Leader pins・Support pins	Straight leader bushings

Suitable

Non JIS material definition is listed on P.1351 - 1352

RoHS

GBS



Set mold temperature to 80˚C generally since the clearance is small when the precision leader bushing is used in combination with the precision leader pin or precision support pin. (**P.878**)

M SUJ2
H 58HRC∼

d		D	t	ℓ													
				L10	L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100
8	0 −0.005	12	6 (L=10…t=4)	10	15	15	15	—	—	—	—	—	—	—	—	—	—
10		14		10	15	20	20	20	20	20							
12	−0.005 −0.010	18		10	15	20	25	25	25	25							
13		20		10	15	20	25	25	25	25							
16		25		10	15	20	25	30	35	30		30					
20	−0.010 −0.015	30		—	15	20	25	30	35	40		40	40	40			
25		35	8		—	20	25	30	35	40		50	50	50			
28		40				—	—	—	—	40		—	—	—			
30		42					25	30	35	40		50	60	60	60		
35	−0.015 −0.020	48					25	30	35	40		50	60	70	70	70	70
40		55					—	—	—	—	45	50	60	70	80	80	80

Part Number		U/Price 1∼9													
Type	d	L10	L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100
GBS	8								—	—	—	—	—	—	—
	10														
	12														
	13														
	16														
	20	—													
	25		—												
	28			—	—	—	—			—	—	—			
	30														
	35														
	40				—	—	—	—							

Quotation

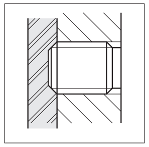
Order

Part Number — L
GBS20 — 35

Days to Ship Quotation

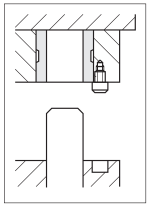
Price Quotation

■Stopper for The Straight Leader Bushing



Screw plugs are commonly used as a stopper to hold straight leader bushings in place. The bushing is provided with a groove on its outer circumference where the screw plug is locked in.
Since the screw plug does not directly hold the bushing's thin wall, deflection of its internal diameter can be minimized. When L=10, screw plug is the value in ( ).

Leader bushing 's internal diameter (d)	Applicable screw plugs
8・10・12・13・16	MSW 6 (4)
20	MSW 6
25・28・30・35・40	MSW 8



If the use of a screw plug is not desired because of possible alignment problems, a hexagonal socket head screw can be used to hold down the bushings as shown in the figure. Make a counterbore on the pin side to accept the screw head.

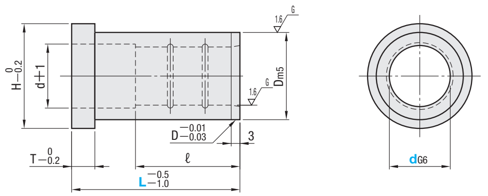
LEADER BUSHINGS

—HEAD TYPE WITH OIL GROOVE—

Plain		Oil groove
Leader pins · Support pins	Suitable	Leader bushings with head

RoHS

GBHE



M SUJ2
H 58HRC～

dG6		T	Dm5		H	ℓ																	
						L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120	L130	L140	L150
8	+0.014 +0.005	5	12	+0.015 +0.007	14	15	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10			14		16	15	20	20	20	20	20												
12	+0.017 +0.006		18		22	15	20	25	25	25	25	25	25										
13			20	+0.017 +0.008	25	15	20	25	25	25	25	25	25										
16		6	25		30	15	20	25	30	35	30	30	30										
20	+0.020 +0.007	8	30		35	—	20	25	30	35	40	40	40	40	40	40							
25			35	+0.020 +0.009	40		20	—	30	35	40	45	50	50	50	50	50	50	50	50	50		
28			40		45		—	25	30	35	40	45	50	56	56	56	—	—	—	—	—		
30			42		47			25	30	35	40	45	50	60	60	60	60	60	60	60	60		
32	+0.025 +0.009		45		50			25	30	35	40	45	50	60	60	60	60	60	60	—	—		
35			48		54			—	30	35	40	—	50	60	70	70	70	70	70	70	70		
36			50		55				30	35	40		50	60	70	—	—	—	—	—	—		
40		10	55	+0.024 +0.011	60				30	35	40	45	50	60	70	80	80	80	80	80	80		
50		12	70		75				—	—	40	45	50	60	70	80	90	100	100	100	100	100	100
60	+0.029 +0.010		80		86						—	—	—	60	70	80	90	100	110	120	120	120	120

Part Number		U/Price 1～9																	
Type	d	L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120	L130	L140	L150
GBHE	8				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	10																		
	12																		
	13																		
	16																		
	20	—																	
	25																		
	28		—										—	—	—	—	—		
	30																		
	32															—			
	35			—				—											
	36												—	—	—	—	—		
	40																		
	50				—	—													
	60						—	—	—										

Quotation

Use GBHE d=36 as the bushing for support pin plain type (SPP, SPPZ, SPPZ—XL (D=36)) P.907

Order

Part Number	—	L
GBHE13	—	40

Price Quotation

Days to Ship Quotation

LEADER BUSHINGS

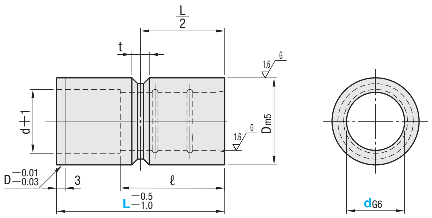
—STRAIGHT TYPE WITH OIL GROOVE—

Plain		Oil groove
Leader pins · Support pins	Suitable	Straight leader bushings

Non JIS material definition is listed on P.1351 - 1352

RoHS

GBSE



M SUJ2
H 58HRC～

dG6		t	Dm5		ℓ															
					L10	L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120
8	+0.014 +0.005	6 (L=10 ⋯→ t=4)	12	+0.015 +0.007	10	15	15	15	—	—	—	—	—	—	—	—	—	—	—	—
10			14		10	15	20	20	20	20	20									
12	+0.017 +0.006		18		10	15	20	25	25	25	25									
13			20	+0.017 +0.008	10	15	20	25	25	25	25									
16			25		10	15	20	25	30	35	30	30	30							
20	+0.020 +0.007		30		10	15	20	25	30	35	40	40	40	40	40	40				
25		8 (L=15 ⋯→ t=6)	35	+0.020 +0.009	—	15	20	25	30	35	40	45	50	50	50	50	50	50		
28			40			—	20	25	30	35	40	45	50	56	—	—	56	—		
30			42				20	25	30	35	40	45	50	60	60	60	60	60		
32	+0.025 +0.009		45				20	25	30	35	40	45	50	60	60	—	—	—		
35			48				—	25	30	35	40	—	50	60	70	70	70	70		
36			50					25	30	—	40		—	—	—	—	—	—		
40			55	+0.024 +0.011				25	30	35	40	45	50	60	70	80	80	80	80	80
50			70					—	30	35	40	45	50	60	70	80	90	100	100	100
60	+0.029 +0.010		80						—	—	—	—	50	60	70	80	90	100	110	120

Part Number		U/Price 1～9															
Type	d	L10	L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120
GBSE	8					—	—	—	—	—	—	—	—	—	—	—	—
	10																
	12																
	13																
	16																
	20																
	25	—															
	28		—									—	—		—		
	30																
	32													—	—		
	35			—					—								
	36						—					—	—	—	—		
	40																
	50				—												
	60					—	—	—	—								

Quotation

Use GBSE d=36 as the bushing for support pin plain type (SPP, SPPZ, SPPZ—XL (D=36)) P.907

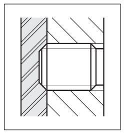
Order

Part Number	—	L
GBSE32	—	80

Days to Ship Quotation

Price Quotation

Example



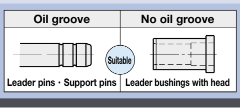
■Stopper for The Straight Leader Bushing

Screw plugs are commonly used as a stopper to hold down straight leader bushings.
The bushing is provided with a groove on its outer circumference where the screw plug is locked in. Since the screw plug does not directly hold the bushing's thin wall, deflection of its internal diameter can be minimized.
When L=10 (d=8～20) or L=15 (d=25), screw plug is the value in ( ).

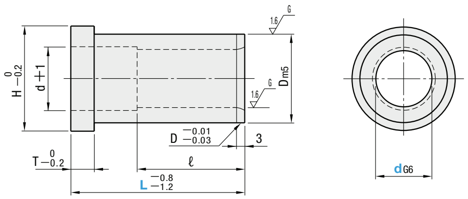
Leader bushing 's internal diameter (d)	Applicable screw plugs
8～20	MSW 6 (4)
25～60	MSW 8 (6)

LEADER BUSHINGS

—HEAD TYPE WITH NO OIL GROOVE—



GBAM



M SUJ2
H 58HRC～

dG6		T	Dm5		H	ℓ L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120	L130	L140	L150
8	+0.014 +0.005	5	12	+0.015 +0.007	14	15	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10			14		16	15	20	20	20	20	20												
12	+0.017 +0.006		18		22	15	20	25	25	25	25	25	25										
13			20	+0.017 +0.008	25	15	20	25	25	25	25	25	25										
16		6	25		30	15	20	25	30	35	30	30	30	30									
20	+0.020 +0.007	8	30		35	15	20	25	30	35	40	40	40	40	40	40	40	40					
25			35	+0.020 +0.009	40	—	—	25	30	35	40	45	50	50	50	50	50	50	50	50			
28			40		45			—	30	—	40	—	50	—	—	—	56	56	—	56			
30		10	42		47				30	35	40	45	50	60	60	60	60	60	60	60	60	60	60
32	+0.025 +0.009		45		50				—	—	—	—	—	—	60	60	60	—	—	60	—	60	60
35			48		54				30	35	40	45	50	60	70	70	70	70	70	70	70	70	70
40			55	+0.024 +0.011	61				30	35	40	45	50	60	70	80	80	80	80	80	80	80	80
50		12	70		76				—	—	40	45	50	60	70	80	90	100	100	100	100	100	100
60	+0.029 +0.010		80		86						—	—	—	60	—	80	90	100	110	120	120	120	120

Part Number Type	d	U/Price 1～9 L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120	L130	L140	L150
GBAM	8				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	10																		
	12																		
	13																		
	16																		
	20																		
	25	—	—						Quotation										
	28																		
	30			—															
	32																		
	35																		
	40																		
	50				—	—													
	60						—	—	—										

Order

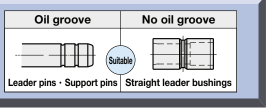
Part Number	—	L
GBAM35	—	80

Days to Ship Quotation

Price Quotation

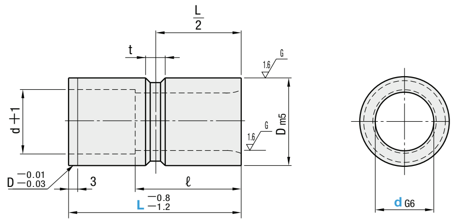
LEADER BUSHINGS

—STRAIGHT TYPE WITH NO OIL GROOVE—



Non JIS material definition is listed on P.1351 - 1352

GBBM



M SUJ2
H 58HRC～

dG6		t	Dm5		ℓ L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120
8	+0.014 +0.005	4	12	+0.015 +0.007	15	15	15	—	—	—	—	—	—	—	—	—	—	—	—
10			14		15	20	20	20	20	20									
12	+0.017 +0.006		18		15	20	25	25	25	25									
13		5	20	+0.017 +0.008	15	20	25	25	25	25		25							
16			25		15	20	25	30	35	30	30	30							
20	+0.020 +0.007	6	30		15	20	25	30	35	40	40	40	40						
25			35	+0.020 +0.009	—	20	25	30	35	40	45	50	50	50	50	50	50		
28		8	40			20	25	—	—	—	45	50	56	—	—	—	—		
30			42			20	25	30	35	40	45	50	60	60	60	60	60		
32	+0.025 +0.009		45			—	25	30	—	40	—	—	—	—	60	—	—		
35			48				25	30	35	40	45	50	60	70	70	70	70	70	
40		9	55				—	30	35	40	45	50	60	70	80	80	80	80	80
50		11	70	+0.024 +0.011				30	35	40	45	50	60	70	80	90	100	100	100
60	+0.029 +0.010		80					—	—	—	—	50	60	70	80	90	100	110	120

Part Number Type	d	U/Price 1～9 L15	L20	L25	L30	L35	L40	L45	L50	L60	L70	L80	L90	L100	L110	L120
GBBM	8				—	—	—	—	—	—	—	—	—	—	—	—
	10															
	12															
	13															
	16															
	20															
	25	—							Quotation							
	28															
	30															
	32		—													
	35															
	40			—												
	50															
	60				—	—	—	—								

Order

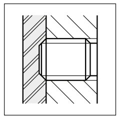
Part Number	—	L
GBBM35	—	80

Days to Ship Quotation

Price Quotation

Example

■Stopper for The Straight Leader Bushing

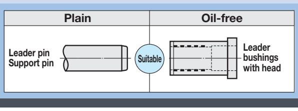


Screw plugs are commonly used as a stopper to hold down straight leader bushings. The bushing is provided with a groove on its outer circumference where the screw plug is locked in.
Since the screw plug does not directly hold down the bushing's thin wall, deflection of its internal diameter can be minimized.

Leader bushing 's internal diameter (d)	Applicable screw plugs
8 · 10 · 12	MSW 4
13 · 16	MSW 5
20 · 25	MSW 6
28～40	MSW 8
50 · 60	MSW10

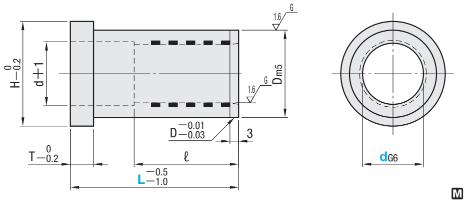
OIL-FREE LEADER BUSHINGS

—Special solid lubricant embedded type with head—



RoHS

GBHEZ



M SUJ2
Special solid lubricant
MoS2 (embedded)
H 58HRC～

- Usable temperature range for the special solid lubricant: up to 80˚C

d_{G6}		T	D_{m5}		H	ℓ L15	L20	L25	L30	L35	L40	L50	L60	L70	L80	L100	L130	L150
10	$^{+0.014}_{+0.005}$	5	14	$^{+0.015}_{+0.007}$	16	15	20	20	20	20	—	—	—	—	—	—	—	—
13	$^{+0.017}_{+0.006}$		20	$^{+0.017}_{+0.008}$	25	15	20	25	25	25	25							
16		6	25		30	15	20	25	30	35	30	30						
20	$^{+0.020}_{+0.007}$	8	30		35	—	20	25	30	35	40	40	40					
25			35	$^{+0.020}_{+0.009}$	40		—	25	30	35	40	50	50	50	50			
30			42		47			25	30	35	40	50	60	60	60	60		
35	$^{+0.025}_{+0.009}$		48		54			—	—	—	40	50	60	70	70	70	70	
40		10	55	$^{+0.024}_{+0.011}$	60						40	50	60	70	80	80	80	
50		12	70		75						—	—	60	70	80	100	100	100

Part Number Type	d	U/Price 1～9 L15	L20	L25	L30	L35	L40	L50	L60	L70	L80	L100	L130	L150
GBHEZ	10						—	—	—	—	—	—	—	—
	13													
	16													
	20	—												
	25		—											
	30													
	35			—	—	—								
	40													
	50						—	—						

Quotation

Order

Part Number	—	L
GBHEZ13	—	40

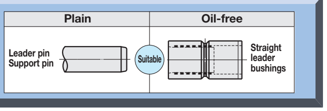
Days to Ship **Quotation**

Price **Quotation**

- Oil-free type······Special solid lubricant eliminates the need for lubrication. (Applying initial running-in oil prior to use can enhance the product's durability furthermore.) Please note that oil oozes out from the solid lubricant at 80˚C.

OIL-FREE LEADER BUSHINGS

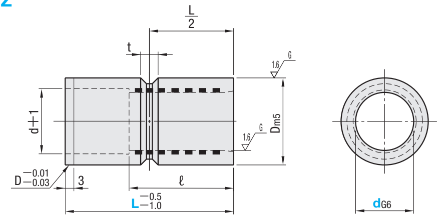
—Straight type with special solid lubricant embedded—



Non JIS material definition is listed on P.1351 - 1352

RoHS

GBSEZ



M SUJ2
Special solid lubricant
MoS2 (embedded)
H 58HRC～

- Usable temperature range for the special solid lubricant: up to 80˚C

d_{G6}		t	D_{m5}		ℓ L15	L20	L25	L30	L35	L40	L50	L60	L80	L100
13	$^{+0.017}_{+0.006}$	6	20	$^{+0.017}_{+0.008}$	15	20	25	25	—	—	—	—	—	—
16			25		15	20	25	30	35					
20	$^{+0.020}_{+0.007}$		30		15	20	25	30	35	40				
25		8	35	$^{+0.020}_{+0.009}$	—	20	25	30	—	40	50			
30			42			20	25	30		40	50			
35	$^{+0.025}_{+0.009}$		48			—	—	30		40	50	60		
40			55	$^{+0.024}_{+0.011}$				30		40	50	60	80	
50			70					—		40	50	60	80	100

Part Number Type	d	U/Price 1～9 L15	L20	L25	L30	L35	L40	L50	L60	L80	L100
GBSEZ	13					—	—	—	—	—	—
	16										
	20										
	25	—									
	30										
	35		—	—							
	40					—					
	50				—						

Quotation

Order

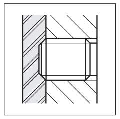
Part Number	—	L
GBSEZ35	—	60

Days to Ship **Quotation**

Price **Quotation**

Example

■Stopper for The Straight Leader Bushing

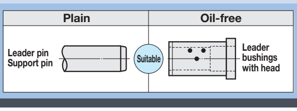


Screw plugs are commonly used as a stopper to hold straight leader bushings. The bushing is provided with a groove on its outer circumference where the screw plug is locked in.
Since the screw plug does not directly hold the bushing's thin wall, deflection of its internal diameter can be minimized.

Leader bushing 's internal diameter (d)	Applicable screw plugs
13・16・20	MSW 6
25～50	MSW 8

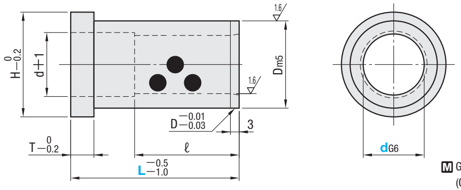
OIL-FREE LEADER BUSHINGS

—COPPER ALLOY WITH HEAD—



RoHS

GBHDZ



- Usable temperature range for the special solid lubricant: up to 150˚C

Ⓜ Grade-4 high strength brass
(CAC304)
(Old JIS: HBsC4)
Special solid lubricant
Graphite (embedded)

dG6		T	Dm5		H	ℓ															
						L15	L20	L25	L30	L35	L40	L50	L60	L70	L80	L90	L100	L110	L120	L130	L150
8	+0.014 +0.005	5	12	+0.015 +0.007	14	—	15	15	—	—	—	—	—	—	—	—	—	—	—	—	—
10			14		16	15	20	20	20	20	20										
12	+0.017 +0.006		18		22	15	20	25	—	—	—										
13			20	+0.017 +0.008	25	15	20	25	25	25	25	25									
16		6	25		30	15	20	25	30	35	30	30									
20	+0.020 +0.007	8	30		35	—	20	25	30	35	40	40	40	40	40						
25			35	+0.020 +0.009	40		20	25	30	35	40	50	50	50	50	50	50				
30			42		47		—	25	30	35	40	50	60	60	60	60	60	60	60		
35	+0.025 +0.009		48		54			—	—	—	40	50	60	70	70	70	70	70	70	70	
40		10	55	+0.024 +0.011	60						40	50	60	70	80	—	80	—	80	80	
50		12	70		75						—	—	60	70	80		100		100	100	100
60	+0.029 +0.010		80		86								—	—	80		100		120	—	120

Part Number		U/Price 1～9															
Type	d	L15	L20	L25	L30	L35	L40	L50	L60	L70	L80	L90	L100	L110	L120	L130	L150
GBHDZ	8	—			—	—	—	—	—	—	—	—	—	—	—	—	—
	10																
	12				—	—	—										
	13																
	16																
	20	—							Quotation								
	25																
	30		—														
	35			—	—	—											
	40											—		—			
	50						—	—									
	60								—	—						—	

Order

Part Number	—	L
GBHDZ13	—	40

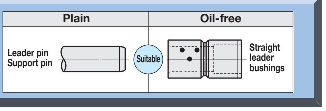
Days to Ship Quotation

Price Quotation

- Oil-free type······Special solid lubricant eliminates the need for lubrication. (Applying initial running-in oil prior to use can enhance the product's durability furthermore.) Please note that oil oozes out from the solid lubricant at 80˚C.

OIL-FREE LEADER BUSHINGS

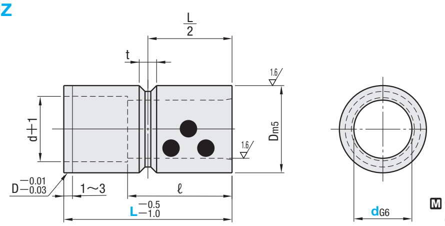
—COPPER ALLOY STRAIGHT TYPE—



Non JIS material definition is listed on P.1351 - 1352

RoHS

GBSDZ



- Usable temperature range for the special solid lubricant: up to 150˚C

Ⓜ Grade-4 high strength brass
(CAC304)
(Old JIS: HBsC4)
Special solid lubricant
Graphite (embedded)

dG6		t	Dm5		ℓ												
					L10	L15	L20	L25	L30	L35	L40	L50	L60	L70	L80	L100	L120
8	+0.014 +0.005	6 (L=10 ⋯ t=4)	12	+0.015 +0.007	10	15	—	—	—	—	—	—	—	—	—	—	—
10			14		10	15	20										
12	+0.017 +0.006		18		10	15	20	25									
13			20	+0.017 +0.008	—	15	20	25	25								
16			25			15	20	25	30	35							
20	+0.020 +0.007		30			15	20	25	30	35	40	40					
25		8 (L=15 ⋯ t=6)	35	+0.020 +0.009		15	20	25	30	35	40	50					
30			42			—	20	25	30	35	40	50	60	60			
35	+0.025 +0.009		48				—	25	30	35	40	50	60	70			
40			55	+0.024 +0.011				—	30	—	40	50	60	70	80		
50			70						—		40	50	60	70	80	100	
60	+0.029 +0.010		80								—	50	60	—	80	100	120

Part Number		U/Price 1～9												
Type	d	L10	L15	L20	L25	L30	L35	L40	L50	L60	L70	L80	L100	L120
GBSDZ	8			—	—	—	—	—	—	—	—	—	—	—
	10													
	12													
	13	—												
	16													
	20							Quotation						
	25													
	30		—											
	35			—										
	40				—		—							
	50					—								
	60							—			—			

Order

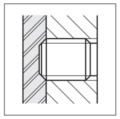
Part Number	—	L
GBSDZ35	—	60

Days to Ship Quotation

Price Quotation

Example

■Stopper for The Straight Leader Bushing



Screw plugs are commonly used as a stopper to hold straight leader bushings.
The bushing is provided with a groove on its outer circumference where the screw plug is locked in.
Since the screw plug does not directly hold the bushing's thin wall, deflection of its internal diameter can be minimized.
When L=10 (d=8～20) or L=15 (d=25), screw plug is the value in ( ).

Leader bushing 's internal diameter (d)	Applicable screw plugs
8～20	MSW 6 (4)
25～60	MSW 8 (6)

OIL-FREE LEADER BUSHINGS FOR HIGH TEMPERATURE USE

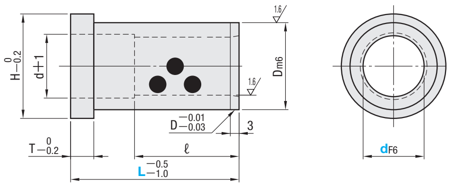
—SPECIAL COPPER ALLOY WITH HEAD—

Plain		Oil-free
Leader pin Support pin	Suitable	Leader bushings with head

RoHS

- Usable temperature range for the special solid lubricant: up to 250˚C

GBHKZ



M Special high strength brass (CAC304 type)
Special solid lubricant (embedded)

dF6		T	Dm6		H	ℓ						
						L20	L25	L30	L35	L40	L50	L60
10	+0.022 +0.013	5	14	+0.018 +0.007	16	20	20	—	—	—	—	—
12	+0.027 +0.016		18	+0.021 +0.008	22	20	25	—	—	—	—	—
13			20		25	20	25	25	25	25	—	—
16		6	25		30	20	25	30	35	30	30	—
20	+0.033 +0.020	8	30	+0.025 +0.009	35	—	25	30	35	40	40	40
25			35		40	—	25	30	35	40	50	50
30			42		47	—	25	30	35	40	50	60

Part Number		U/Price 1～9						
Type	d	L20	L25	L30	L35	L40	L50	L60
GBHKZ	10			—	—	—	—	—
	12			—	—	—	—	—
	13						—	—
	16				Quotation			—
	20	—						
	25	—						
	30	—						

	Part Number	—	L
Order	GBHKZ16	—	30

Days to Ship: Quotation

Price: Quotation

■Characteristics of Special Copper Alloy

- Higher usable temperature limit: Comparing the conventional leader bushings in page 1047 and 1048, Oil-Free Leader Bushings for High Temperature Use is available to use at higher temperature condition as 250˚C such as molding engineering plastics in higher temperature due to special copper alloy material and lubricant coating agent is applied instead of grease.
(Endurance will be improved by applying oil before using)
- Wider the clearance: Comparing G6 of inner diameter tolerance of the conventional leader bushings in page 1047 and 1048, Oil-Free Leader Bushings for High Temperature Use widen the rage to F6 which enable to work for thermal expansion by higher molding temperature.

OIL-FREE LEADER BUSHINGS FOR HIGH TEMPERATURE USE

—SPECIAL COPPER ALLOY STRAIGHT TYPE—

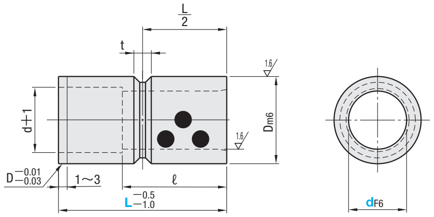
Plain		Oil-free
Leader pin Support pin	Suitable	Straight leader bushings

Non JIS material definition is listed on P.1351 - 1352

RoHS

- Usable temperature range for the special solid lubricant: up to 250˚C

GBSKZ



M Special high strength brass (CAC304 type)
Special solid lubricant (embedded)

dF6		t	Dm6		ℓ					
					L20	L25	L30	L35	L40	L50
13	+0.027 +0.016	6	20	+0.021 +0.008	20	25	25	—	—	—
16			25		20	25	30	35	—	—
20	+0.033 +0.020		30	+0.025 +0.009	20	25	30	35	40	—
25		8	35		20	25	30	35	40	50
30			42		20	25	30	35	40	50

Part Number		U/Price 1～9					
Type	d	L20	L25	L30	L35	L40	L50
GBSKZ	13				—	—	—
	16					—	—
	20			Quotation			—
	25						
	30						

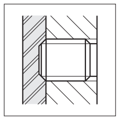
	Part Number	—	L
Order	GBSKZ20	—	25

Days to Ship: Quotation

Price: Quotation

Example

■Stopper for The Straight Leader Bushing



Screw plugs are commonly used as a stopper to hold straight leader bushings. The bushing is provided with a groove on its outer circumference where the screw plug is locked in.
Since the screw plug does not directly hold the bushing's thin wall, deflection of its internal diameter can be minimized.

Leader bushing 's internal diameter (d)	Applicable screw plugs
13～20	MSW 6
25～30	MSW 8

■Characteristics of Special Copper Alloy

- Higher usable temperature limit: Comparing the conventional leader bushings in page 1047 and 1048, Oil-Free Leader Bushings for High Temperature Use is available to use at higher temperature condition as 250˚C such as molding engineering plastics in higher temperature due to special copper alloy material and lubricant coating agent is applied instead of grease.
(Endurance will be improved by applying oil before using)
- Wider the clearance: Comparing G6 of inner diameter tolerance of the conventional leader bushings in page 1047 and 1048, Oil-Free Leader Bushings for High Temperature Use widen the rage to F6 which enable to work for thermal expansion by higher molding temperature.

LEADER BUSHINGS FOR MIDDLE・LARGE MOLD/STOPPER PLATES FOR LEADER BUSHINGS FOR LARGE MOLD

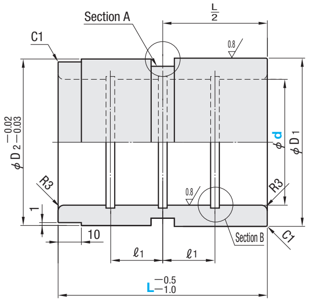
—STRAIGHT TYPE—

LEADER PINS FOR RUBBER MOLD/LEADER BUSHINGS FOR RUBBER MOLD

—TAPER TYPE・SPHERICAL TYPE—

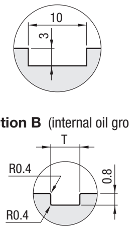
RoHS

GBST


Section A
L/2
C1
0.8
φD2 −0.02 −0.03
φd
φD1
R3
R3
1
0.8
Section B
C1
10
ℓ1
ℓ1
L −0.5 −1.0

・**Section A** (external groove) **details**

・**Section B** (internal oil groove) **details**

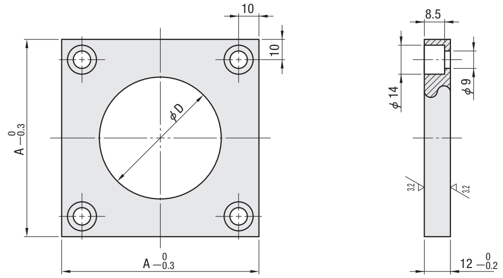

10
3
T
R0.4
0.8
R0.4

M SUJ2
H 58HRC～

D1		D2		d		ℓ1	T	Part Number		L	U/Price
								Type	d		1～9
55	+0.05 +0.04	55	−0.02 −0.03	40	+0.05 +0.04	17.5	4	GBST	40	70	Quotation
70	+0.07 +0.06	70		50	+0.07 +0.06	20			50	80	
80	+0.08 +0.07	80		60	+0.08 +0.07	25			60	100	
100	+0.10 +0.08	100		80	+0.10 +0.08	30	5		80	120	

RoHS

GPPH


10
10
φD
A 0 −0.3
A 0 −0.3
8.5
φ14
φ9
3.2
3.2
12 0 −0.2

C0.5～C1.0 chamfering all around.

M S45C S Black Oxide

A	D	Applicable leader pin bushings		Part Number		U/Price
		Internal diameter d	External diameter D	Type	No.	1～9
80	45	40	55	GPPH	40	Quotation
100	55	50	70		50	
110	65	60	80		60	
140	85	80	110		80	

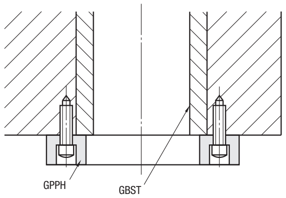
Order

Part Number	—	L
GBST40 GPPH40	—	70

Days to Ship **Quotation**

Price **Quotation**

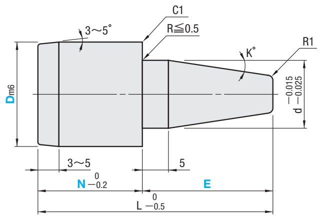
Example

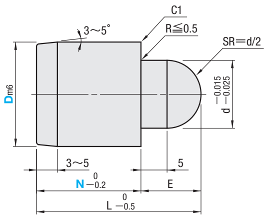


RoHS

GMT (Taper type)

GMR (Spherical type)


3～5°
C1
R≦0.5
K°
R1
Dm6
d −0.015 −0.025
3～5
5
N 0 −0.2
E
L 0 −0.5


3～5°
C1
R≦0.5
SR=d/2
Dm6
d −0.015 −0.025
3～5
5
N 0 −0.2
E
L 0 −0.5

A center hole left on both ends.

M SCM415
H 58HRC～

■Taper type

Press-fit section Dm6		d	L	K°	Part Number		N	E	U/Price
					Type	D			1～9
16	+0.018 +0.007	10	28	10	GMT	16	14	14	Quotation
			33	10			19	14	
			38	6				19	
20	+0.021 +0.008	13	28	10		20	14	14	
			33	10				19	
			38	7				24	
			43	6				29	
			48	5				34	
			33	10			19	14	
			38	10				19	
			43	7				24	
			48	6				29	
			53	5				34	

■Spherical type

Press-fit section Dm6		d	L	E	Part Number		N	U/Price
					Type	D		1～9
16	+0.018 +0.007	10	29	10	GMR	16	19	Quotation
20	+0.021 +0.008	13	30	11		20		

Order

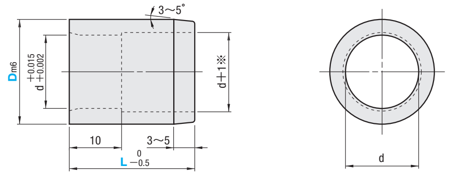
Part Number	—	N	—	E
GMT20	—	14	—	19
GMR16	—	19		

Days to Ship **Quotation**

Price **Quotation**

RoHS

GMB


3～5°
Dm6
d +0.015 +0.002
d+1※
10
3～5
L 0 −0.5
d

※There is no (d+1) relief machining in the case of L=9.

M SCM415
H 8HRC～

Press-fit section Dm6		d	Part Number		L	U/Price
			Type	D		1～9
16	+0.018 +0.007	10	GMB	16	9	Quotation
					14	
					19	
20	+0.021 +0.008	13		20	9	
					14	
					19	
					24	
					29	

Order

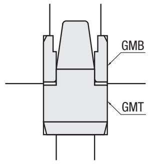
Part Number	—	L
GMB16	—	19

Days to Ship **Quotation**

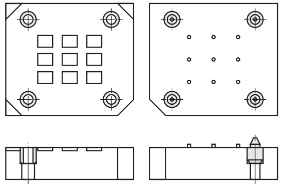
Price **Quotation**

Example

■Example of leader pins and bushings

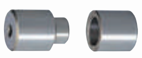


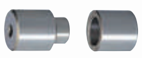
■Example of leader pins and bushings



COMPONENTS FOR POSITIONING

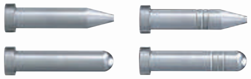
COMPONENTS FOR POSITIONING





Product Name Part Number	Tapered Pin Set —Standard type— TPN TPNV□ VTPN□ ZTPN□	—Bushing PL installation type— TPNC TPV□ VTPV□ ZTPV□	—Pin・Bushing PL installation type— TPVX□ VTPVX□	Positioning Straight Pin Sets—Standard type— TPNF□
Page	933	935	937	938

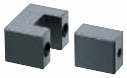
Positioning Straight Pin Sets—Bushing PL installation type— TPNFC□	—Pin・Bushing PL installation type— TPNFCX□	Small Diametter Positioning Pins・Bushings with Head F—TPNF□	Spacers for Tapered Pin Set TPS TPD TPG	—Thickness designation type— FTPS FTPD FTPG
939	940	941	943	944



Positioning Pins—Shaft diameter (D) selection type／Shaft diameter (P) designation 0.01mm increments type— PPD□ PPH□ PPDF□ PPHF□	Tapered Guide Set TGPS	Positioning pins for Insert Molding PPI PPIR
945	947	948

Tapered Block Sets TBS	—Precision type— VTBS□	Positionig Straight Block Sets—PL installation type— TBSF	— Oil groove type PL installation type— TBSFM	Extra Precision Positioning Straght Block Sets—PL installation type— VTBSF
949		951	952	953

—TiN coating・Side installation type— TSSBN	Side Tapered Block Sets—Side installation type— TSST	—Side installation type— TSSB	— Oil groove type Side installation type— TSSBM
954	955	957	957



Extra Precision Side Straight Block Sets—Side installation type— VTSSB	Positioning Straight Block Sets—PL installation・L dimension short type— TTSB	VTTSB	Locating Block Set LBJX□	Side Cotter Block LKWN
958	959		961	962

■ List of Positioning Components

1 Select basic shape according to mold size, mold temperature, plate processing method, installation method, positioning method. → Pin or block, tapered or straight.

2 Select the necessary precision (components precision, tapering angle, clearance) according to molding products tolerance and angle.

3 Select the components size such as external dimension etc. from standard details in each page.

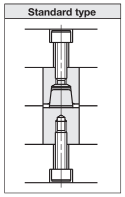
Part Number			1 Shapes			2 Positioning precision					3 Page
Set	Pin only	Bushing only				Group	Ext. dia. or External tolerance	Tapered section to outer diameter or Component concentricity of straight part	Tapered section to outer diameter or Symmetry tolerance of straight part	Angle of tapering shape or Clearance of straight shape	
TPN	—	—	Pin	Tapered shape	Standard type	Standard	k6	Match mark type	—	1° 3° 5° 10°	P.927
TPNV	TPNVP	TPNVB						0.01 or less		1° 3° 5°	
VTPN	VTPNP	VTPNB				Precision	+0.005 0	0.005 or less		1° 3° 5°	
ZTPN	ZTPNP	ZTPNB				Extra Precision		0.003 or less		0.5° 1° 3°	
TPNC	—	—			Bushing PL installation type	Standard	k6	Match mark type		1° 3° 5°	P.929
TPV	TPVP	TPVB						0.01 or less		1° 3° 5°	
VTPV	VTPVP	VTPVB				Precision	+0.005 0	0.005 or less		1° 3° 5°	
ZTPV	ZTPVP	ZTPVB				Extra Precision		0.003 or less		1° 3°	
TPVX	TPVXP	TPVXB			Pin・Bushing PL installation type	Standard	k6	0.01 or less		1° 3° 5°	P.931
VTPVX	VTPVXP	VTPVXB				Precision	+0.005 0	0.005 or less			
TPNF	TPNFP	TPNFB		Straight shape	Standard type	Precision		0.003 or less		0～0.010	P.932
TPNFC	TPNFCP	TPNFCB			Bushing PL installation type						P.933
TPNFCX	TPNFCXP	TPNFCXB			Pin・Bushing PL installation type						P.934
—	F—TPNFP	F—TPNFB			Head type		0 —0.005			—	P.935
—	PPD□ PPDF□	—						—			P.939
	PPH□ PPHF□	—									
	PPI	—				Standard	0 —0.01				P.942
	PPIR	—									
TBS	—	—	Block	Tapered shape	Burrow installation	Standard	+0.02 0	—	Matches the external combining pin and bushing.	1° 3° 5°	P.943
VTBS	VTBSP	VTBSB				Precision	0 —0.005		0.005 or less	1° 3° 5°	
TBSF	—	—		Straight shape	Burrow installation	Precision	0 —0.005		0.003 or less	0.005～0.015	P.945
TBSFM	—	—									P.946
VTBSF	—	—				Extra Precision			0.003 or less	0.002～0.008	P.947
TSSBN	—	—			Side installation	Precision	0 —0.01		0.003 or less	0.003～0.013	P.948
TSST	—	—		Tapered		Precision	0 —0.005		0.003 or less	1° 3°	P.949
TSSB	—	—		Straight shape		Precision	0 —0.005		0.003 or less	0.005～0.015	P.951
TSSBM	—	—									
VTSSB	—	—				Extra Precision	0 —0.005		0.003 or less	0.002～0.008	P.952
TTSB	—	—			Burrow installation	Precision	0 —0.005		0.003 or less	0.005～0.015	P.953
VTTSB	—	—				Extra Precision			Matches the external combining pin and bushing.	0～0.006	
LBJX	LBJXP	LBJXB				Standard	0 —0.005		—	0.005～0.020	P.955
LKWN	—	—	(Matches tapering on the plate)				—			—	P.956

TAPERED PIN SET

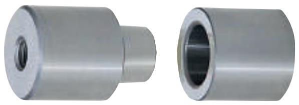
—STANDARD TYPE—

Non JIS material definition is listed on P.1351 - 1352

Standard type

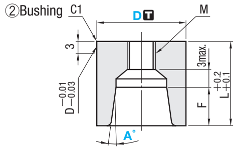


RoHS

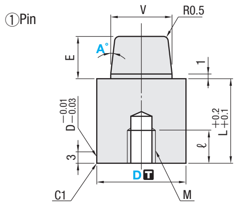


Group	Part Number			D	Components concentricity of tapered section to the diameter of pin and bushing	M	H
	Set	Pin only	Bushing only				
Standard	TPN	—	—	D_{k6}	(Match mark type)	SKD11 equivalent	58～62HRC
	TPNV	TPNVP	TPNVB		0.01 or less		
Precision	VTPN	VTPNP	VTPNB	$D^{+0.005}_{0}$	0.005 or less		
Extra Precision	ZTPN	ZTPNP	ZTPNB		0.003 or less		

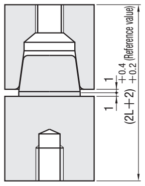
②Bushing



①Pin



●Dimensions when combined



D	L	V	E	F	①Pin		②Setting tap for bushing
					M	ℓ	
8	13	5	6	5	M 3	7.5	M 3
10	14	7	6	5	M 4	10	M 4
13	14	7	6	5	M 4	10	M 4
16	14	10	6	5	M 5	10	M 5
20	19	13	9	8	M 6	12	M 6
25	24	16	12	11	M 8	16	M 8
30	29	20	15	14	M10	20	M10
32	29	20	15	14	M10	20	M10
35	34	24	18	17	M12	24	M12
42	39	30	24	23	M12	24	M12

■ Standard D_{k6} · match mark type

D_{k6}		Part Number		A°	U/Price
		Type	D		1～9 Set
13	+0.012 +0.001	TPN	13	1 3 5 10	Quotation
16			16		
20	+0.015 +0.002		20		
25			25		
30			30		
32	+0.018 +0.002		32		
35			35		
42			42		

■ Standard D_{k6} · component concentricity 0.01 or less

D_{k6}		Part Number		A°	U/Price 1～9	
		Type	D		(①+②) Set	①Pin ②Bushing
10	+0.010 +0.001	TPNV (①+②Set) TPNVP (①Pin) TPNVB (②Bushing)	10	1 3 5	Quotation	
13	+0.012 +0.001		13			
16			16			
20	+0.015 +0.002		20			
25			25			
30			30			
32	+0.018 +0.002		32			
35			35			

■ Precision $D^{+0.005}_{0}$ · component concentricity 0.005 or less

D tolerance	Part Number		A°	U/Price 1～9	
	Type	D		(①+②) Set	①Pin ②Bushing
+0.005 0	VTPN (①+②Set) VTPNP (①Pin) VTPNB (②Bushing)	8	1	Quotation	
		10	1 3 5		
		13			
		16			
		20			
		25			
		30			

■ Extra Precision $D^{+0.005}_{0}$ · component concentricity 0.003 or less

D tolerance	Part Number		A°	U/Price 1～9	
	Type	D		(①+②) Set	①Pin ②Bushing
+0.005 0	ZTPN (①+②Set) ZTPNP (①Pin) ZTPNB (②Bushing)	8	1	Quotation	
		10	※(0.5)		
		13	1 3 5		
		16			
		20			
		25			

※A° (0.5) is only available for the set (ZTPN) sale.

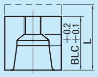
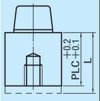
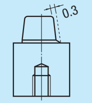
- Before using a TPN (match mark type), align the match marks.
- When selecting a pin independently, use a combination of a pin and bushing of the same accuracy.

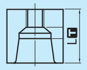
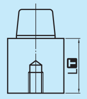
Order Part Number — A
TPN16 — 3

Price Quotation

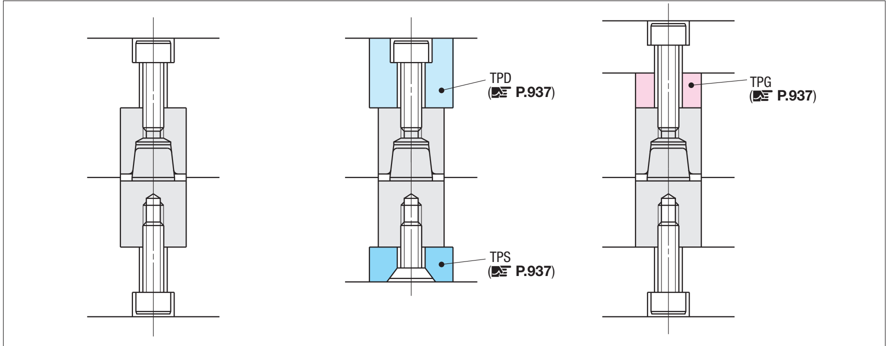
Days to Ship Quotation

Alterations Part Number — A — (BLC · PLC · AC · BLK · PLK)
TPN16 — 3 — BLC12.0—PLC12.0—AC—BLK—PLK
Quotation

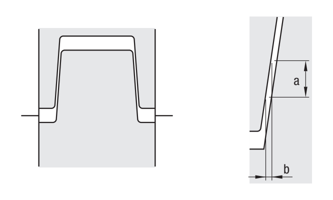
Alterations	Code	Spec.	1Code
	BLC	Shortens the bushing's L dimension. BLC=0.1mm increments L−2≦BLC<L The tap depth becomes shorter by (L−BLC) Available also for a set. To change the pin length as well, combine with PLC.	Quotation
	PLC	Shortens the pin's L dimension. PLC=0.1mm increments L−5≦PLC<L The tap depth becomes shorter by (L−PLC) Available also for a set. To change the bushing length as well, combine with BLC.	
	AC	Air vent processing (single) A 0.3mm deep flat cutting is performed in parallel to the cone angle.	

Alterations	Code	Spec.	1Code
	BLK	Changes the bushing's L dimension tolerance. $L^{+0.2}_{+0.1}$ ···› $L^{+0.02}_{0}$ Available also for a set. To change the pin length (L) tolerance as well, combine with alteration PLK. ⊗ Not applicable to the L dimension tolerance (reference valve) for a set.	Quotation
	PLK	Changes the pin's L dimension tolerance. $L^{+0.2}_{+0.1}$ ···› $L^{+0.02}_{0}$ Available also for a set. To change the bushing length (L) tolerance as well, combine with alteration BLK. ⊗ Not applicable to the L dimension tolerance (reference valve) for a set.	

■How to Mount



■When using



When the matching cone angle is large, the height of tapered pin and bushing must be adjusted so that they fit more tightly. On the other hand, it is necessary to take possible sticking of the pin and bushing into consideration when the angle is small. At 0.5° and 1° taper (also 3° taper in some cases), sticking can be avoided by setting them slightly afloat as shown in the figure.
When the angle is small, the creep of the height (a in the left drawing) against the width (b in the left drawings) also small so that there is no need to worry about positioning inaccuracies.

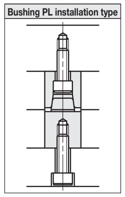
(Value b to error a) *For 0.5°, slightly afloat setting is especially recommended.

Angled \ a	0.1	0.3	0.5
0.5°	0.0009	0.0026	0.0044
1°	0.0018	0.005	0.009
3°	0.005	0.016	0.026

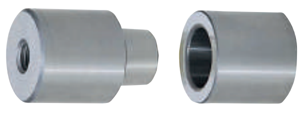
TAPERED PIN SET

—BUSHING PL INSTALLATION TYPE—

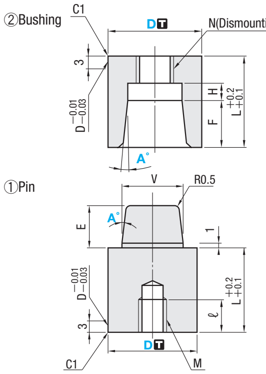
Non JIS material definition is listed on P.1351 - 1352



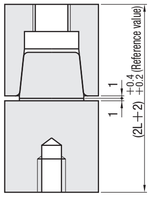
RoHS



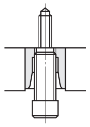
Group	Part Number			D	Components concentricity of tapered section to the diameter of pin and bushing	M	H
	Set	Pin only	Bushing only				
Standard	TPNC	—	—	D_{k6}	(Match mark type)	SKD11 equivalent	58～62HRC
	TPV	TPVP	TPVB		0.01 or less		
Precision	VTPV	VTPVP	VTPVB	$D^{+0.005}_{0}$	0.005 or less		
Extra Precision	ZTPV	ZTPVP	ZTPVB		0.003 or less		



●Dimensions when combined



●About N dimension



As shown in the figure, the bushing can be easily removed by screwing a bolt into its tap (N) and extracting it.

D	L	V	E	F	H	①Pin		②Bolt for mounting bushing	②Bushing
						M	ℓ		N
13	14	7	6	5	3.3	M 3	6	M 3	M 4
16	14	10	6	5	5.3	M 5	10	M 5	M 6
20	19	13	7	7	7	M 6	12	M 6	M 8
25	24	16	10	10	9	M 8	16	M 8	M10
30	29	20	13	13	11	M10	20	M10	M12
32	29	20	13	13	11	M10	20	M10	M12
35	34	24	16	16	13	M12	24	M12	M14
42	39	30	21	21	13	M12	24	M12	M14

■ Standard D_{k6} · match mark type

D_{k6}		Part Number		A°	U/Price
		Type	D		1～9 Set
13	+0.012 +0.001	TPNC	13	1 3 5	Quotation
16			16		
20	+0.015 +0.002		20		
25			25		
30			30		
32	+0.018 +0.002		32		
35			35		
42			42		

■ Standard D_{k6} · component concentricity 0.01 or less

D_{k6}		Part Number		A°	U/Price 1～9	
		Type	D		(①+②) Set	①Pin ②Bushing
13	+0.012 +0.001	TPV (①+②Set) TPVP (①Pin) TPVB (②Bushing)	13	1 3 5	Quotation	
16			16			
20	+0.015 +0.002		20			
25			25			
30			30			
32	+0.018 +0.002		32			
35			35			

■ Precision $D^{+0.005}_{0}$ · component concentricity 0.005 or less

D tolerance	Part Number		A°	U/Price 1～9	
	Type	D		(①+②) Set	①Pin②Bushing
$^{+0.005}_{0}$	VTPV (①+②Set) VTPVP (①Pin) VTPVB (②Bushing)	13	1 3 5	Quotation	
		16			
		20			
		25			
		30			

■ Extra Precision $D^{+0.005}_{0}$ · component concentricity 0.003 or less

D tolerance	Part Number		A°	U/Price 1～9	
	Type	D		(①+②) Set	①Pin ②Bushing
$^{+0.005}_{0}$	ZTPV (①+②Set) ZTPVP (①Pin) ZTPVB (②Bushing)	16	1 3	Quotation	
		20			
		25			
		30			
		35			

- Before using a TPNC(match mark type), align the match marks.
- When selecting a pin independently, use a combination of a pin and bushing of the same accuracy.

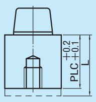
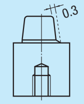
Order Part Number — A
TPNC16 — 3

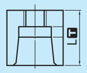
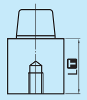
Price Quotation

Days to Ship Quotation

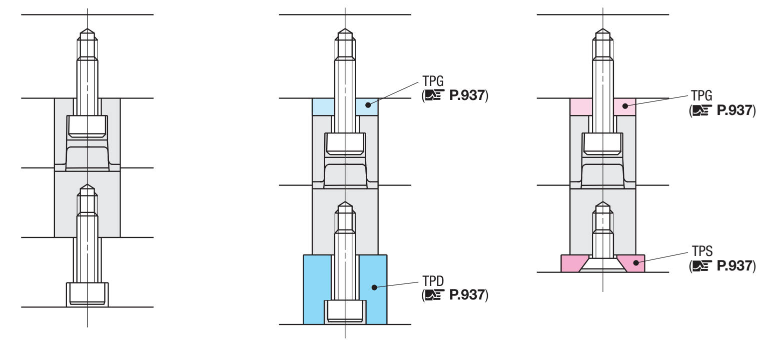
Alterations Part Number — A — (PLC · AC · BLK · PLK)
TPNC16 — 3 — PLC12.0—AC—BLK—PLK

Quotation

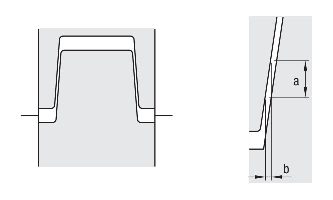
Alterations	Code	Spec.	1Code
	PLC	Shortens the pin's L dimension. PLC＝0.1mm increments L−5≦PLC＜L The tap depth becomes shorter by (L−PLC) Available also for a set.	Quotation
	AC	Air vent processing (single) 0.3mm deep flat cutting is performed in parallel to the cone angle.	

Alterations	Code	Spec.	1Code
	BLK	Changes the bushing's L dimension tolerance. $L^{+0.2}_{+0.1}$ ···› $L^{+0.02}_{0}$ Available also for a set. To change the pin length (L) tolerance as well, combine with alteration PLK. ⊗ Not applicable to the L dimension tolerance (reference valve) for a set.	Quotation
	PLK	Changes the pin's L dimension tolerance. $L^{+0.2}_{+0.1}$ ···› $L^{+0.02}_{0}$ Available also for a set. To change the bushing length (L) tolerance as well, combine with alteration BLK. ⊗ Not applicable to the L dimension tolerance (reference valve) for a set.	

■How to Mount



■When using



When the matching cone angle is large, the height of tapered pin and bushing must be adjusted so that they fit more tightly. On the other hand, it is necessary to take possible sticking of the pin and bushing into consideration when the angle is small. At 1° taper (also 3° taper in some cases), sticking can be avoided by setting them slightly afloat as shown in the figure.
When the angle is small, the creep of the height (a in the left drawing) against the width (b in the left drawings) also small so that there is no need to worry about positioning inaccuracies.

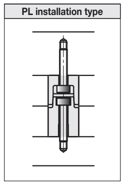
(Value b to error a)

Angled \ a	0.1	0.3	0.5
1°	0.0018	0.005	0.009
3°	0.005	0.016	0.026

TAPERED PIN SET

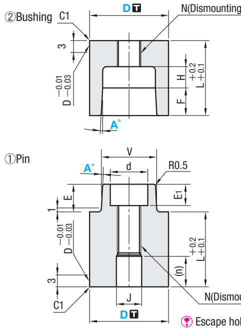
—PIN・BUSHING PL INSTALLATION TYPE—

PL installation type

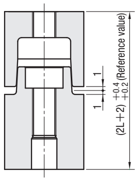


RoHS

Group	Part Number			T D	Components concentricity of tapered section to the diameter of pin and bushing	M	H
	Set	Pin only	Bushing only				
Standard	TPVX	TPVXP	TPVXB	D_{k6}	0.01 or less	SKD11 equivalent	58～62HRC
Precision	VTPVX	VTPVXP	VTPVXB	$D^{+0.005}_{0}$	0.005 or less		

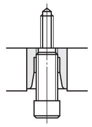


●Dimensions when combined



Escape hole in the screw at the bottom of pin.

● **About N dimension**



As shown in the figure, the bushing can be easily removed by screwing a bolt into its tap (N) and extracting it.

D	L	V	E	F	H	①Pin		Bolt for mounting Pin・Bushing	N	(n) Escape hole on pin bottom	J Escape hole diameter on pin bottom
						d	E1				
13	14	10	6	5	3.3	6.5	3.3	M 3	M 4	8.7	4.4
16	14	12	6	5	4.4	8	4.4	M 4	M 5	5.6	5.4
20	19	14	7	7	5.4	9.5	5.4	M 5	M 6	8.6	6.4
25	24	16	10	10	7	11	6.5	M 6	M 8	11.5	8.6
30	29	22	13	13	9	14	8.6	M 8	M10	13.4	11
35	34	24	16	16	11	17.5	10.8	M10	M12	15.2	13
42	39	30	21	21	13	20	13	M12	M14	19	15

■ Standard D_{k6}・component concentricity 0.01 or less

D_{k6}		Part Number Type	D	A°	U/Price 1～9 (①+②) Set	①Pin ②Bushing
13	+0.012 +0.001	TPVX (①+②Set) TPVXP (①Pin) TPVXB (②Bushing)	13	1 3 *5	Quotation	
16			16			
20	+0.015 +0.002		20			
25			25			
30			30			
35	+0.018 +0.002		*35			
42			42			

A° 5 is not available for *D35

■ Precision $D^{+0.005}_{0}$・component concentricity 0.005 or less

D tolerance	Part Number Type	D	A°	U/Price 1～9 (①+②) Set	①Pin② Bushing
$^{+0.005}_{0}$	VTPVX (①+②Set) VTPVXP (①Pin) VTPVXB (②Bushing)	13	1 3 5	Quotation	
		16			
		20			
		25			
		30			

- When selecting a pin independently, use a combination of a pin and bushing of the same accuracy.
- Note: TPVX and VTPVX are not available to change combination of TPV and VTPV, PL Installation Type of Tapered Pin Set, due to different V dimension.

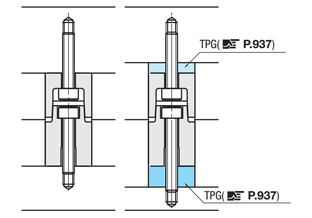
Order

Part Number	—	A
TPVX16	—	3

Days to Ship **Quotation**

Price **Quotation**

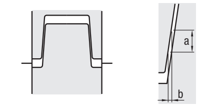
■How to Mount



■Characteristics

- ● Makes the maintenance easier because it can be installed and removed from PL side.
- ● It is capable of preventing wear and damage in core pins, since it can be positioned before core pins are inlayed.

■When using



When the matching cone angle is large, the height of tapered pin and bushing must be adjusted so that they fit more tightly. On the other hand, it is necessary to take possible sticking of the pin and bushing into consideration when the angle is small. At 1° taper (also 3° taper in some cases), sticking can be avoided by setting them slightly afloat as shown in the figure.

When the angle is small, the creep of the height (a in the above drawing) against the width (b in the above drawing) is also small so that there is no need to worry about positioning inaccuracies.

(Value b to error a)

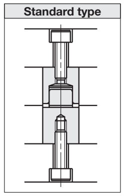
Angle \ a	0.1	0.3	0.5
1°	0.0018	0.005	0.009
3°	0.005	0.016	0.026

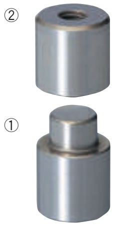
POSITIONING STRAIGHT PIN SETS

—STANDARD TYPE—

Non JIS material definition is listed on P.1351 - 1352

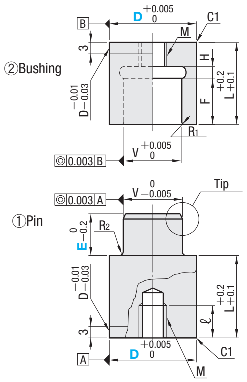
Standard type

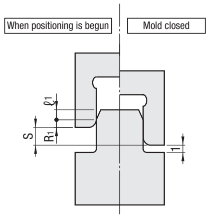




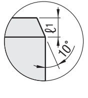
RoHS

TPNF (Set)
TPNFP (Pin only)
TPNFB (Bushing only)





Details of the tip



M SKD11 equivalent
H 58～62HRC

Installation bolt size	M	ℓ	V	ℓ1	R1	R2	H	F	L	S (Effective holding amount)	Part Number Type	D	E	U/Price 1～9 TPNF (①+②Set)	TPNFP (①Pin) TPNFB (②Bushing)
M 4	4	10	5	1.0	0.5	0.8	2.5	5	14.5	4.5	TPNF (①+②Set) TPNFP (①Pin) TPNFB (②Bushing)	10	7	Quotation	
							8.5		19.5				13		
			7				2.5		14.5			13	7		
								11	24.5	10.5			13		
							5.5						16		
M 5	5		10				2.5	5	14.5	4.5		16	7		
								11	24.5	10.5			13		
							5.5						16		
M 6	6	12	13				2.5	6	14.5	5.5		20	8		
								9	19.5	8.5			11		
				2.0	1.0	1.5		14	29	12.0			16		
							6.5		29.5				20		
M 8	8	16	16	1.0	0.5	0.8	2.5	9	19.5	8.5		25	11		
								11	24.5	10.5			13		
				2.0	1.0	1.5		18	34	16.0			20		
							7.5		39				25		
M10	10	20	20				2.5	23		21.0		30	25		

Order

Part Number	—	E
TPNF13	—	7

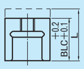
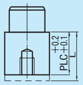
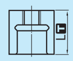
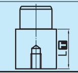
Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	E	—	(BLC···etc.)
TPNF16	—	7	—	BLC14.0—BLK

Quotation

Alterations	Code	Spec.	1Code
	BLC	Shortens the bushing's L dimension. BLC=0.1mm increments L−2≦BLC<L The tap depth becomes shorter by (L−BLC) Available also for a set. To change the pin length as well, combine with PLC.	Quotation
	PLC	Shortens the pin's L dimension. PLC=0.1mm increments L−5≦PLC<L The tap depth becomes shorter by (L−PLC) Available also for a set. To change the bushing length as well, combine with BLC.	
	BLK	Changes the bushing's L dimension tolerance. $L^{+0.2}_{+0.1} \cdots\to L^{+0.02}_{0}$ Available also for a set. To change the pin length (L) tolerance as well, combine with alteration PLK.	
	PLK	Changes the pin's L dimension tolerance. $L^{+0.2}_{+0.1} \cdots\to L^{+0.02}_{0}$ Available also for a set. To change the bushing length (L) tolerance as well, combine with alteration BLK.	

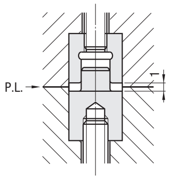
■Characteristics

- Suitable for positioning in precision molds such as connector and electronic device.
- It is capable of preventing wear and damage in core pins, since it can be positioned before core pins are inlayed.

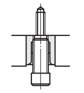
■When using

- Contacting the pin and bushing when mold is closed may cause damage. Please leave a clearance of about 1mm on PL.
- Use precision leader pins since clearance is fairly small.

■How to Mount



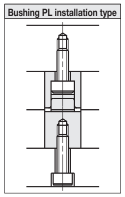
・**About N dimension (Dismouting tap hole)**

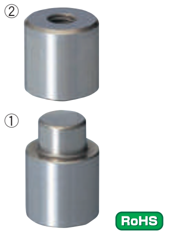


As shown in the figure, the bushing can be easily removed by screwing a bolt into its tap (M) and extracting it.

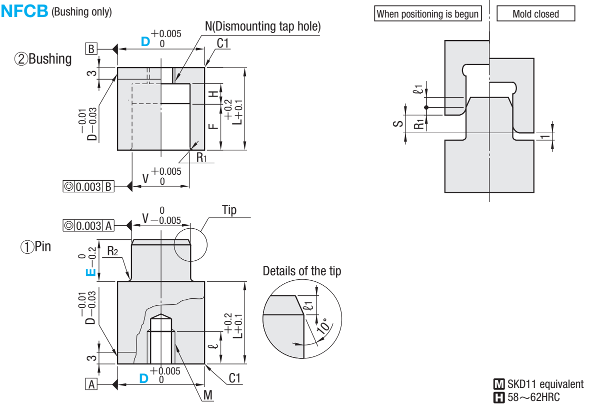
POSITIONING STRAIGHT PIN SETS

—BUSHING PL INSTALLATION TYPE—


Bushing PL installation type



TPNFC (Set)
TPNFCP (Pin only)
TPNFCB (Bushing only)


②Bushing
①Pin
D +0.005 0
N(Dismounting tap hole)
C1
B
3
H
F
+0.2 +0.1
L
D −0.01 −0.03
R1
◎0.003 B
V +0.005 0
◎0.003 A
V 0 −0.005
Tip
E 0 −0.2
R2
ℓ
A
M
Details of the tip
ℓ1
10°
When positioning is begun
Mold closed
S

M SKD11 equivalent
H 58～62HRC

Installation bolt size	M	ℓ	N (Tap)	V	ℓ1	R1	R2	H	F	L	S (Effective holding amount)	Part Number		E	U/Price 1～9	
												Type	D		TPNFC (①+②Set)	TPNFCP (①Pin) TPNFCB (②Bushing)
M4	4	10	M 5	7	1.0	0.5	0.8	5	6	14.5	4.5	TPNFC(①+②Set) TPNFCP(①Pin) TPNFCB(②Bushing)	13	7	Quotation	
				10									16			
M5	5		M 6	13				6	9	19.5	7.5		20	10		
M6	6	12	M 8	16				8	11	24.5	9.5		25	12		
M8	8	16	M10	20	2.0	1.0	1.5	11	17	34	14.0		30	18		

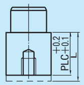
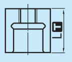
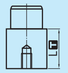
☎ **Order** Part Number — E
TPNFC20 — 10

Days to Ship Quotation

P Price Quotation

Alterations ☎ Part Number — E — (PLC···etc.)
TPNFC16 — 7 — BLK

Quotation

Alterations	Code	Spec.	1Code
	PLC	Shortens the pin's L dimension. PLC=0.1mm increments L−5≦PLC<L The tap depth becomes shorter by (L−PLC) Available also for a set. To change the bushing length as well, combine with BLC.	Quotation
	BLK	Changes the bushing's L dimension tolerance. $L^{+0.2}_{+0.1} \cdots\rightarrow L^{+0.02}_{0}$ Available also for a set. To change the pin length (L) tolerance as well, combine with alteration PLK.	
	PLK	Changes the pin's L dimension tolerance. $L^{+0.2}_{+0.1} \cdots\rightarrow L^{+0.02}_{0}$ Available also for a set. To change the bushing length (L) tolerance as well, combine with alteration BLK.	

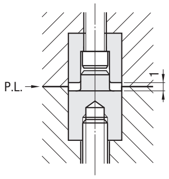
■Characteristics

- Suitable for positioning in precision molds such as connector and electronic device.
- It is capable of preventing wear and damage in core pins, since it can be positioned before core pins are inlayed.
- Bushing PL installation type: Makes the maintenance easier because it can be installed and removed from PL side.

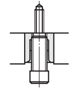
■When using

- Contacting the pin and bushing when mold is closed may cause damage. Please leave a clearance of about 1mm on PL.
- Use precision leader pins since clearance is fairly small.

■How to Mount



●About N dimension (Dismouting tap hole)

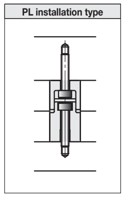


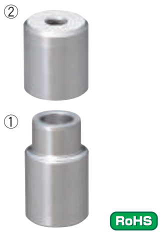
As shown in the figure above, the bushing can be easily removed by screwing a bolt into its tap (N) and extracting it.

POSITIONING STRAIGHT PIN SETS

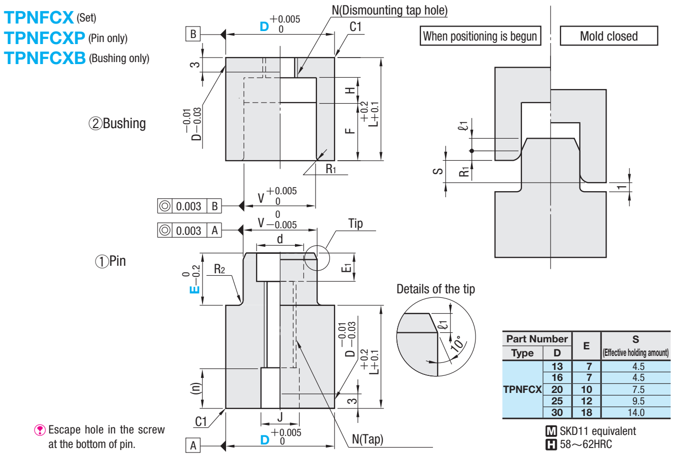
—PIN・BUSHING PL INSTALLATION TYPE—

Non JIS material definition is listed on P.1351 - 1352


PL installation type



TPNFCX (Set)
TPNFCXP (Pin only)
TPNFCXB (Bushing only)


②Bushing
①Pin
D +0.005 0
N(Dismounting tap hole)
C1
B
3
H
F
L +0.2 +0.1
D −0.01 −0.03
R1
◎0.003 B
V +0.005 0
◎0.003 A
V 0 −0.005
d
Tip
E 0 −0.2
R2
E1
(n)
J
A
N(Tap)
Details of the tip
ℓ1
10°
When positioning is begun
Mold closed
S

Escape hole in the screw at the bottom of pin.

Part Number		E	S (Effective holding amount)
Type	D		
TPNFCX	13	7	4.5
	16	7	4.5
	20	10	7.5
	25	12	9.5
	30	18	14.0

M SKD11 equivalent
H 58～62HRC

Installation bolt size	d	E1	N (Tap)	V	ℓ1	R1	R2	H	F	L	(n) Escape hole on pin bottom	J Escape hole diameter on pin bottom	Part Number		E	U/Price 1～9	
													Type	D		TPNFCX (①+②Set)	TPNFCXP (①Pin) TPNFCXB (②Bushing)
M3	6.5	3.3	M4	10	1.0	0.5	0.8	4	6	14.5	10.2	4.4	TPNFCX(①+②Set) TPNFCXP(①Pin) TPNFCXB(②Bushing)	13	7	Quotation	
														16			
M5	9.5	5.4	M6	13				6	9	19.5	12.1	6.4		20	10		
				16					11	24.5	19.1			25	12		
M6	11	6.5	M8	20	2.0	1.0	1.5	8	17	34	29.5	8.6		30	18		

TPNFCX is not available to change bushing combination of TPNFC, PL Installation Type of Positioning Straight Pin Set, due to different V dimension.

☎ **Order** Part Number — E
TPNFCX 20 — 10

P Price Quotation

Days to Ship Quotation

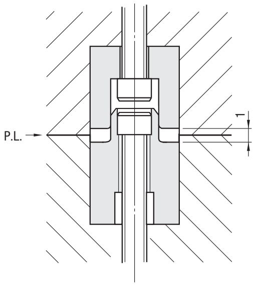
■Characteristics

- Makes the maintenance easier because it can be installed and removed from PL side.
- It is capable of preventing wear and damage in core pins, since it can be positioned before core pins are inlayed.

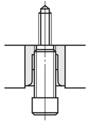
■When using

- Contacting the pin and bushing when mold is closed may cause damage. Please leave a clearance of about 1mm on PL.
- Use precision leader pins since clearance is fairly small.

■How to Mount



●About N dimension (Dismouting tap hole)

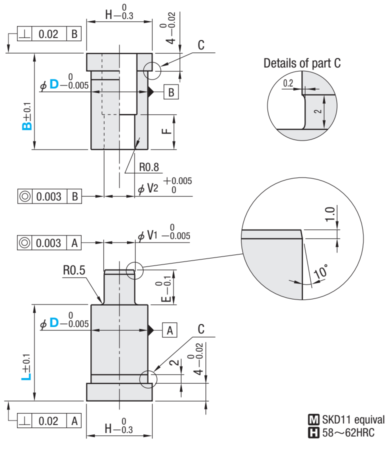


As shown in the figure above, the bushing can be easily removed by screwing a bolt into its tap (N) and extracting it.

SMALL DIAMETER POSITIONING PINS · BUSHINGS WITH HEAD

RoHS

① **F—TPNFP** (Pin)
② **F—TPNFB** (Bushing)



- Introduction recess processing D$^{-0.01}_{-0.03}$ for both pin and bushing
- Please purchase pins and bushings independently. Sets are not available.

M SKD11 equivalent
H 58～62HRC

① Pin

H	V1	E	Part Number		L	U/Price 1～9					
			Type	D		L14.5	L19.5	L24.5	L29.5	L34.5	L39.5
9	3	6	F—TPNFP	6	14.5 19.5 24.5 29.5 34.5 39.5	Quotation					
10	5			8							
15	7	8		10							

②Bushing

H	V2	F	Part Number		B	U/Price 1～9					
			Type	D		B14.5	B19.5	B24.5	B29.5	B34.5	B39.5
9	3	5	F—TPNFB	6	14.5 19.5 24.5 29.5 34.5 39.5	Quotation					
10	5			8							
15	7	7		10							

- Pins and bushings have different ordering codes. (Use products of the same dimensions as D dimensions of pins and bushings.)
- Note: That they are not available to change combination of positioning straight pin sets (TPNF, TPNFC, TPNFCX) due to different specification.

Order

Part Number	—	L or B
F—TPNFP 6	—	L24.5
F—TPNFB 6	—	B29.5

Days to Ship Quotation

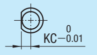
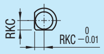
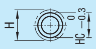
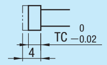
Price Quotation

Non JIS material definition is listed on P.1351 - 1352

Alterations

Part Number	—	L or B	—	(KC · RKC · HC · TC)
F—TPNFP 8	—	L19.5	—	KC4.0
F—TPNFB 8	—	B24.5	—	TC2.0

Quotation

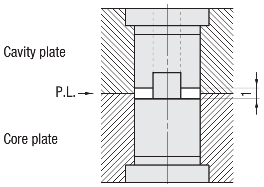
Alterations	Code	Spec.	1Code
	KC	Single flat cutting KC=0.1mm increments D/2≦KC<H/2 ①Pin②Bushing	Quotation
	RKC	Two flats (right angled) cutting RKC=0.1mm increments D/2≦RKC<H/2 ①Pin②Bushing	
	HC	Head diameter change HC=0.1mm increments D≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft. ①Pin②Bushing	
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4.0 ①Pin②Bushing L (B) dimension becomes shorter by (L(B) TC)	

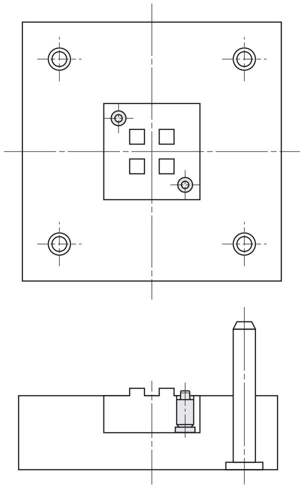
■**Characteristics**

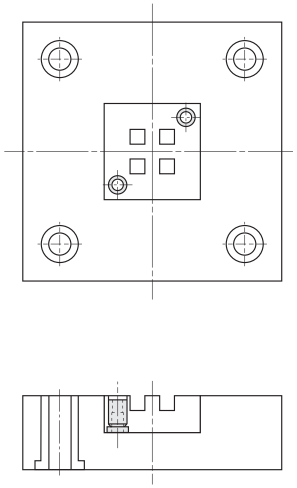
- This product is developed for installation into cavity insert. perfect for small molds with little positioning space.
- Pins and bushings can be designated respectively in 5 mm increments according to the plate thickness of cavity insert.
- Adjustment of digging depth is unnecessary due to head.
- Positioning precision is improved by simultaneously processing cavity plates and core plates.
- To reduce the positioning clearance, use precision leader pins.

Example

■**How to Mount**



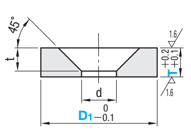




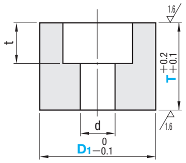
SPACERS FOR TAPERED PIN SET

RoHS

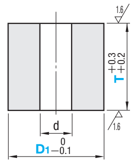
TPS



TPD



TPG



Bolt is attached to **TPS** and **TPD** as accessories.

M S45C
H 46～50HRC

Applicable tapered pin D	Plate thickness	d	t	Supplied bolts	Part Number Type	Part Number D1	T	U/Price 1～9 pcs.
13	20	4.5	3.0	FB 4−10	TPS	16	5	Quotation
	25			FB 4−15			10	
16	20	5.5		FB 5−12		20	5	
	25			FB 5−16			10	
20	25	6.5	4.0	FB 6−12		25	5	
	30			FB 6−16			10	
25	30	8.5	4.5	FB 8−15		32	5	
	35			FB 8−20			10	
30	40	10.5	7.5	FB 10−20		35	10	
32				FB 10−20		38	10	
10	25	4.5	6	CB 4−10	TPD	13	10	
	30			CB 4−15			15	
	35			CB 4−20			20	
	40			CB 4−25			25	
13	25			CB 4−10		16	10	
	30			CB 4−15			15	
	35			CB 4−20			20	
	40			CB 4−25			25	
16	25	5.5	7	CB 5−10		20	10	
	30			CB 5−15			15	
	35			CB 5−20			20	
	40			CB 5−25			25	
	45			CB 5−30			30	
	50			CB 5−35			35	
20	30	6.5	6	CBS 6−16		25	10	
	35		9	CB 6−15			15	
	40			CB 6−20			20	
	45			CB 6−25			25	
	50			CB 6−30			30	
	60			CB 6−40			40	
	70			CB 6−50			50	
25	40	8.5	10	CB 8−15		32	15	
	45			CB 8−20			20	
	50			CB 8−25			25	
	60			CB 8−35			35	
	70			CB 8−45			45	
	80			CB 8−55			55	
30	50	10.5	12	CB 10−20		35	20	
	60			CB 10−30			30	
	70			CB 10−40			40	
	80			CB 10−50			50	
32	50			CB 10−20		38	20	
	60			CB 10−30			30	
	70			CB 10−40			*40	
	80			CB 10−50			*50	
35	50	12.5	9	CBS 12−25		42	15	
	60		14	CB 12−30			25	
42	60			CB 12−25		48	20	
	70			CB 12−35			30	

Sizes marked* are discontinued at April 2010.

Applicable tapered pin D	Plate thickness	d	Applicable bolts M	Part Number Type	Part Number D1	T	U/Price 1～9 pcs.
8	20	3.5	M 3	TPG	8	5	Quotation
	25					10	
10	20	4.5	M 4		10	5	
	25					10	
13	20				13	5	
	25					10	
16	20	5.5	M 5		16	5	
	25					10	
	30					15	
	35					20	
	40					25	
	45					30	
	50					35	
20	25	6.5	M 6		20	5	
	30					10	
	35					15	
	40					20	
	45					25	
	50					30	
	60					40	
	70					50	
25	30	8.5	M 8		25	5	
	35					10	
	40					15	
	45					20	
	50					25	
	60					35	
	70					*45	
30	35	10.5	M10		30	5	
	40					10	
	45					15	
	50					20	
	60					30	
32	35				32	5	
	40					10	
	50					20	
	60					30	
	70					40	
35	40	12.5	M12		35	5	
	45					10	
	50					15	
	60					25	
	80					45	
42	45				42	5	
	50					10	

Sizes marked* are discontinued at April 2010.

Order	Part Number	—	T
	TPS20	—	10

Price **Quotation**

Days to Ship **Quotation**

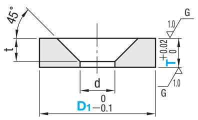
SPACERS FOR TAPERED PIN SET

—THICKNESS DESIGNATION TYPE—

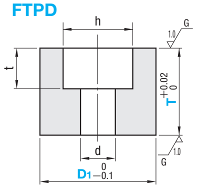
Non JIS material definition is listed on P.1351 - 1352

RoHS

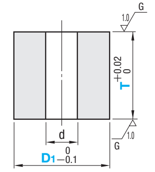
FTPS



FTPD



FTPG



Select an appropriate bolt for **FTPS** and **FTPD** after referring to **FB(P.1189)**, **CB(P.1185)** and **CBS(P.1187)**.

M S45C
H 46～50HRC

Applicable tapered pin D	h	d	t	Applicable bolts	Part Number Type	Part Number D1	T 0.1mm increments	U/Price 1～9 pcs.
13	—	4.5	3.0	FB4	FTPS	16	5.0～10.0	Quotation
16		5.5		FB5		20	5.0～10.0	
20		6.5	4.0	FB6		25	6.0～10.0	
25		8.5	4.5	FB8		32	6.5～10.0	
10	8	4.5	6	CB4	FTPD	13	10.0～14.9	
							15.0～19.9	
							20.0～25.0	
13						16	10.0～14.9	
							15.0～19.9	
							20.0～25.0	
16	9.5	5.5	7	CB5		20	10.0～14.9	
							15.0～19.9	
							20.0～24.9	
							25.0～29.9	
							30.0～35.0	
20	11	6.5	6	CBS6		25	10.0～14.9	
			9	CB6			15.0～19.9	
							20.0～24.9	
							25.0～29.9	
							30.0～39.9	
							40.0～50.0	
25	14	8.5	10	CB8		32	15.0～19.9	
							20.0～24.9	
							25.0～34.9	
							35.0～44.9	
							45.0～55.0	
30	17.5	10.5	12	CB10		35	20.0～29.9	
							30.0～39.9	
							40.0～50.0	
32						38	20.0～29.9	
							30.0～39.9	
							40.0～50.0	
35	20	12.5	9	CBS12		42	15.0～24.9	
			14	CB12			25.0～34.9	
							35.0～45.0	
42						48	20.0～29.9	
							30.0～40.0	

Applicable tapered pin D	d	Applicable bolts M	Part Number Type	Part Number D1	T 0.1mm increments	U/Price 1～9 pcs.
8	3.5	M 3	FTPG	8	1.0～10.0	Quotation
10	4.5	M 4		10	1.0～10.0	
13				13	1.0～10.0	
16	5.5	M 5		16	1.0～ 9.9	
					10.0～14.9	
					15.0～19.9	
					20.0～24.9	
					25.0～29.9	
					30.0～35.0	
20	6.5	M 6		20	1.0～ 9.9	
					10.0～14.9	
					15.0～19.9	
					20.0～24.9	
					25.0～29.9	
					30.0～39.9	
					40.0～50.0	
25	8.5	M 8		25	1.0～ 9.9	
					10.0～14.9	
					15.0～19.9	
					20.0～24.9	
					25.0～34.9	
					35.0～44.9	
					45.0～55.0	
30	10.5	M10		30	1.0～ 9.9	
					10.0～14.9	
					15.0～19.9	
					20.0～29.9	
					30.0～39.9	
					40.0～50.0	
32				32	1.0～ 9.9	
					10.0～14.9	
					15.0～19.9	
					20.0～29.9	
					30.0～39.9	
					40.0～50.0	
35	12.5	M12		35	1.0～ 9.9	
					10.0～14.9	
					15.0～24.9	
					25.0～34.9	
					35.0～45.0	
42				42	1.0～ 9.9	
					10.0～19.9	
					20.0～29.9	
					30.0～40.0	

Order	Part Number	—	T
	FTPS20	—	9.8

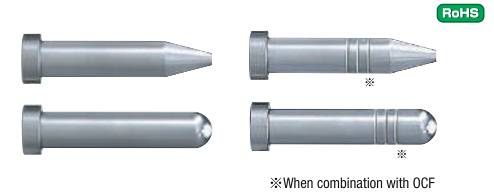
Price **Quotation**

Days to Ship **Quotation**

POSITIONING PINS

—SHAFT DIAMETER (D) SELECTION TYPE/SHAFT DIAMETER (P) DESIGNATION 0.01mm INCREMENTS TYPE—

Non JIS material definition is listed on P.1351 - 1352

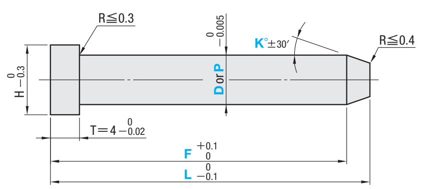


※When combination with OCF

M H	Part Number Type Shaft diameter selection	 Shaft diameter designation	Shape
SKD11 equivalent 58~62HRC	PPD	PPDF	T B
SKH51 58~60HRC	PPH	PPHF	

Shape (Tip shape)

Shape T (Tapered)



F···0.1mm increments

F≧10.00

and

$0.3 \leqq (L-F) \leqq \frac{L}{2}$

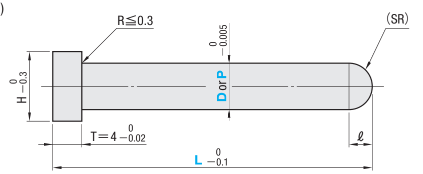
and

$\frac{D\ \text{or}\ P}{2} - (L-F)\tan K \geqq 0.1$

K···1° increments

1≦K≦45

Shape B (Spherical processed)



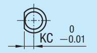
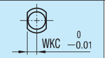
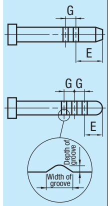
$\ell = \frac{D\ \text{or}\ P}{2}$

Alterations

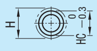
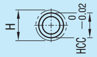
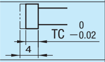
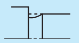
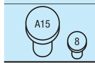
Part Number — L — P — Tip size F・K — (KC・WKC···etc.)

PPDB 5 — 30.0 — HC 7.0

PPHFT 6 — 40.0 — P5.80 — F35.0 — K30 — OCF2—E10—G3

Alterations	Code	Spec.	1Code
	KC	Single flat cutting (DorP)/2≦KC<H/2	
	WKC	Two flats cutting (DorP)/2≦WKC<H/2	
	OCF	Adds an oil groove (free designation) Designation method OCF2—E10—G3 (Two grooves) OCF3—E10—G3 (Three grooves) OCF=No. of grooves (2 or 3) E=1mm increments When Shape T, L−F+1<E<L−T−{G×(No. of grooves−1)}−5 When Shape B, ℓ+1<E<L−T−{G×(No. of grooves−1)}−5 G=1mm increments 1≦G≦10	Quotation

Shaft diameter D or No.	Depth of groove	Width of groove
5・5.5・6・6.5	0.1	0.5
7・8	0.2	0.6
10	0.3	0.8

Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments (DorP)≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	HCC	Head diameter change (precision) HCC=0.1mm increments (DorP)+0.5≦HCC<H−0.3	Quotation
	TC	Head thickness change TC=0.1mm increments 1.5≦TC<4 (Dimension L remains unchanged.) 4−TC≦Lmax.−L	
	TRN	Relief under the head (No need for plate chamfering)	
	NHC	Numbering on the head How to order P.396 ⊗ Express services not available	

Unit of designation for key flat cutting (KC and WKC)

(1) When specifying key flat cutting according to the shaft diameter

Unit of designation Shaft diameter (D) selection 0.05mm increments is possible, and shaft diameter (P) designation 0.005mm increments is possible.

(2) When freely specifying key flat cutting

Unit of designation 0.1mm increments

■**Shaft diameter (D) selection type**

H	Part Number Type	 Shape	 D	L 0.1mm increments	Shape (Tip size)	U/Price 1~4 PPD□ T	 B	 PPH□ T	 B
8	PPD PPH	T B	5	25.0~60.0	Shape T only F···0.1mm increments K···1° increments	Quotation			
9			6						
10			7						
11			8						
15			10						

■**Shaft diameter (P) designation 0.01mm increments type**

H	Part Number Type	 Shape	 No.	L 0.1mm increments	P 0.01mm increments	Shape (Tip size)	U/Price 1~4 PPDF□ T	 B	 PPHF□ T	 B
8	PPDF PPHF	T B	5	25.0~60.0	4.50~4.99	Shape T only F···0.1mm increments K···1° increments	Quotation			
9			6		5.50~5.99					
11			8		7.00~7.99					
15			10		8.00~9.99					

Order

Part Number — L — P — Tip size F・K

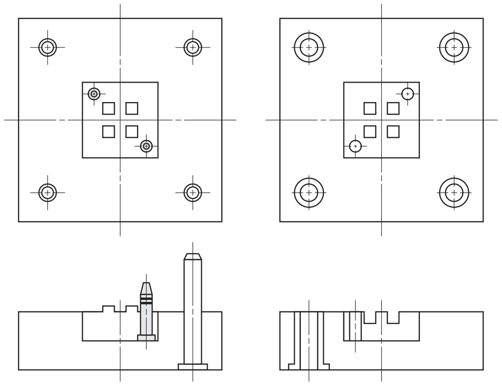
PPDB 8 — 60.0

PPHFT5 — 50.0 — P4.80 — F45.0 — K20

Days to Ship Quotation

Price Quotation

Example



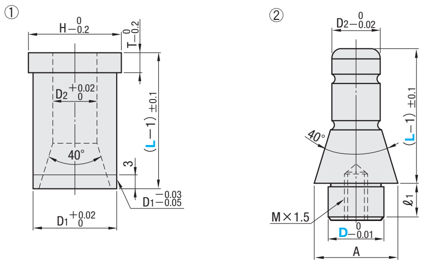
- Can also be used for determining the position of the cavity insert. Effective for a small mold with little space.
- Material equivalent to SKD11, and also SKH51, are both tempered at high temperature.
- When reducing the positioning clearance, use a precision guide pin.

Non JIS material definition is listed on P.1351 - 1352

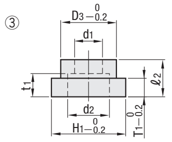
TAPERED LEADER PIN SETS

RoHS

TGPS


①
H $-^{0}_{0.2}$
T $-^{0}_{0.2}$
D2 $^{+0.02}_{0}$
40°
(L−1) ±0.1
3
D1 $^{-0.03}_{-0.05}$
D1 $^{+0.02}_{0}$
②
D2 $-^{0}_{0.02}$
40°
(L−1) ±0.1
M×1.5
ℓ1
D $-^{0}_{0.01}$
A

①Leader Bushing
M SUJ2
H 58～60HRC
②Guide pin
M SUJ2
H 58～60HRC
③Spacers
M S45C
H 38～43HRC
S Black Oxide (Fe3O4)


③
D3 $-^{0}_{0.2}$
d1
t1
ℓ2
d2
H1 $-^{0}_{0.2}$
T1 $-^{0}_{0.2}$

D1	D2	D3	A	H	T	M	ℓ1	H1	ℓ2	T1	d1	d2	t1	Part Number Type	Part Number D	L						
14	8	9.8	12.4	16	4	4	8	14	8	4.5	4.4	7.6	4.5	TGPS	10	20	25					
18	10	11.6	17	20	4	5	8	16	8	4	6	9	5.5		12	20	25	30				
25	14	15.9	21	30	6	8	15	20	14	5	8.2	13.5	8.2		16	20	25	30	35	40	50	60
30	18	19.1	26	35	8			24			8.5	14	9		20		25	30	35	40	50	60
35	23	24.1	30	40				30		6					25			30		40	50	60

TGPS16—20 ···› ℓ1=10,M8×10

Order

Part Number	—	L
TGPS16	—	40

Price Quotation

Days to Ship Quotation

■Characteristics

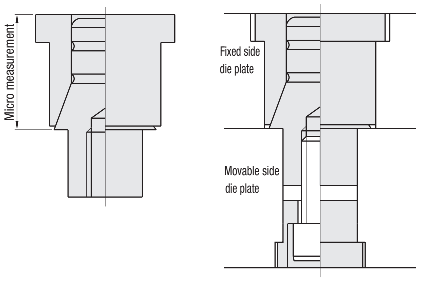
It has the positioning functions of Leader Pin/Leader Bushing/Tapered Pin Sets. It saves space and functions in positioning itself with the tapered section.

■When using

A set of a pin, bushing and spacer. Make sure to use the pin and bushing in this combination.

■How to Mount the Tapered Leader Pin Set

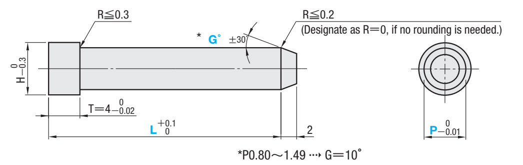
1.Create a hole for the leader pin and bushing in about $^{+0.01}_{0}$ tolerance.
2.Set the leader pin and bushing in slightly tight, and measure the distance between the top of the bushing and the bottom of the pin's tapered flange using a micrometer. (Right drawing)
3.Finish the fixed die plate with a tolerance of −0.01～−0.03 of the value obtained in 2, above.
4.Press fit the leader bushing into the fixed die plate.
5.Set the leader pin on the movable die plate and hold it by attaching the spacer from the rear and fastening it with a bolt.
6.Set the die plates on a molding machine and close them. This should make the leader pin's flange slightly bite into the die plate and completely align it with the bushing.


Micro measurement
Fixed side die plate
Movable side die plate

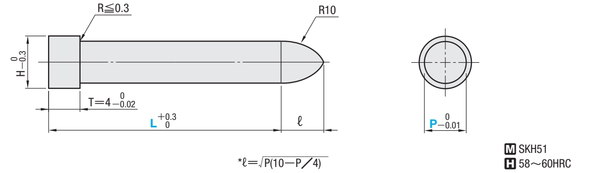
POSITIONING PINS FOR INSERT MOLDING

RoHS

PPI (Tip tapered type)


R≦0.3
R≦0.2
(Designate as R=0, if no rounding is needed.)
* G° ±30'
H $-^{0}_{0.3}$
T=4 $-^{0}_{0.02}$
L $^{+0.1}_{0}$
2
P $-^{0}_{0.01}$
*P0.80～1.49 ···› G=10°

PPIR (Tip R type)


R≦0.3
R10
H $-^{0}_{0.3}$
T=4 $-^{0}_{0.02}$
L $^{+0.3}_{0}$
ℓ
P $-^{0}_{0.01}$
*ℓ=√P(10−P／4)

M SKH51
H 58～60HRC

H	Part Number Type	Part Number No.	L 0.1mm increments	P 0.01mm increments	G°	U/Price 1～4 pcs.	U/Price 5～19	U/Price 20～49	U/Price 50～100
4	PPI PPIR	2	10.0～40.0	0.80～1.49	10	Quotation			
				1.50～1.99	10				
5		2.5		1.50～2.49					
6		3		2.00～2.99					
7		4		3.00～3.99	15				

To be quoted on price & lead time above Max. Q'ty.

Order

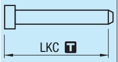
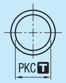
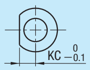
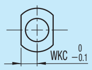
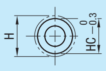
Part Number	—	L	—	P	—	G	—	(No rounding)
PPI 3	—	20.0	—	P2.60	—	G15	—	R0
PPIR2.5	—	18.0	—	P2.00				

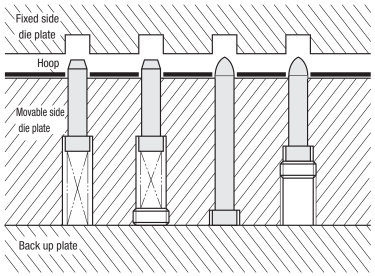
Days to Ship Quotation

Alterations

Part Number	—	L	—	P	—	G	—	(LKC・PKC···etc.)
PPI3	—	20.00	—	P2.60	—	G15	—	LKC

Example Use for hoop positioning in insert molding process.

Alterations	Code	Spec.	1Code
 LKC T	LKC	Changes the tolerance. L $^{+0.1}_{0}$ ···› $^{+0.05}_{0}$ When using LKC, L dimension can be designated in 0.01mm increments.	Quotation
 PKC T	PKC	Changes shaft diameter tolerance Designation method PKC P $-^{0}_{0.01}$ ···› $-^{0}_{0.005}$	
 KC $-^{0}_{0.1}$	KC	KC=0.1mm increments KC=P/2 ···› 0.005mm increments possible When KC=P/2 KC $-^{0}_{0.1}$ ···› $-^{0}_{0.02}$ P/2≦KC<H/2	
 WKC $-^{0}_{0.1}$	WKC	WKC=0.1mm increments WKC=P/2 ···› 0.005mm increments possible When WKC=P/2, WKC $-^{0}_{0.1}$ ···› $-^{0}_{0.02}$ P/2≦WKC<H/2	
 H, HC $-^{0}_{0.3}$	HC	HC=0.1mm increments P≦HC<H In relation to the diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	


Fixed side die plate
Hoop
Movable side die plate
Back up plate

TAPERED BLOCK SETS

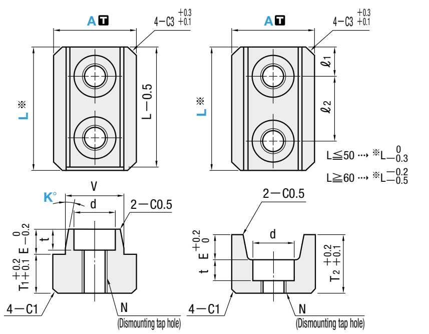
Non JIS material definition is listed on P.1351 - 1352

RoHS

Group	Part Number			A	V dimension symmetry against A plane		M	H
	Set	Pin only	Bushing only					
Standard	TBS	—	—	+0.02 0	(Match mark type)	To add fitting processing, not applicable to combination with other than sets.	SKD11 equivalent	58～62HRC
Precision	VTBS	VTBSP	VTBSB	0 −0.005	0.005 or less	It can be used without caring set combination or direction.ex) -color molding, insert molding, etc.		

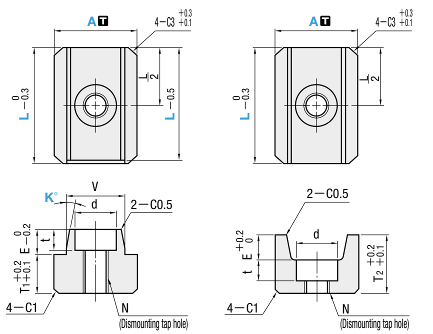
■Mounting bolt hole: 2 (L30～120)

①Pin ②Bushing



■Mounting bolt hole: 1 (L20～25, excpet A12 and A16)

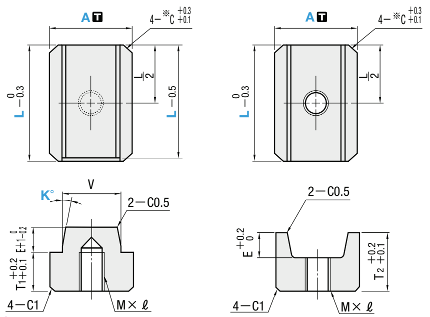
①Pin ②Bushing



■Mounting bolt hole: 1 (A12 and A16 only)

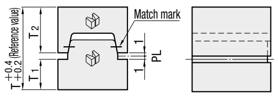
A12 ··· ※C2
A16 ··· ※C3

①Pin ②Bushing



The height of the pin ① is E+1mm.

●Dimensions when combined



- There is a match mark on the Misumi logo side, facilitating position alignment.
- Set the blocks so that the 'MISUMI' logo is visible from outside of the die.

TBS must be used in set combination and direction being preset upon delivery.

VTBS has only the Misumi logo. It does not have a match mark.

Order				
Part Number	—	L	—	K
TBS35	—	40	—	3
VTBS25	—	30	—	1

Days to Ship: Quotation

Price: Quotation

■ Standard Match mark type

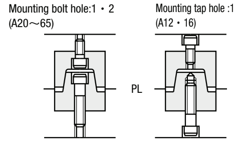
V	E	T	T1	T2	Bolt hole ℓ1	Bolt hole ℓ2	Bolt hole d	Bolt hole t	Installation bolts	Tap N	Tap hole M×ℓ	No. of bolt holes	Part Number Type	Part Number A	L Selection	K° Selection	U/Price 1～9 Set
7	*5	23	7	14	—	—	—	—	M3 bolt	M 3	M3×6	1 (Tap hole)	TBS	12	15	1 3 5	Quotation
															20		
9	*7								M4 bolt	M 4	M4×6	1 (Tap hole)		16	20		
															25		
12					—	—	6.5	3.5	M3 bolt	M 4	—	1		20	20		
															25		
					7.5	15						2			30		
					10	20									40		
15	8	28	9	17	—	—	8	5	M4 bolt	M 5		1		25	20		
															25		
					7.5	15						2			30		
					10	20									40		
17		32	10	20	—	—	9	6	M5 bolt	M 6		1		30	25		
					7.5	15						2			30		
					10	20									40		
20	10	35	11	22	7.5	15								35	30		
					10	20	11	7	M6 bolt	M 8					40		
						30									50		
25	15	45	14	29		20								45	40		
						30									50		
					17.5	40									75	3 5	
					20	60									100		
35	20	60	19	39	15	30	14	9	M8 bolt	M10				65	60		
					20	50									90		
					30	60									120		

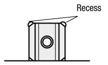
The height of the pin is E+1mm for A12 and A16.

■ Precision

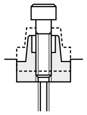
V	E	T	T1	T2	Bolt hole ℓ1	Bolt hole ℓ2	Bolt hole d	Bolt hole t	Installation bolts	Tap N	No. of bolt holes	Part Number Type	Part Number A	L Selection	K° Selection	U/Price 1～9 VTBS (①+②)	U/Price 1～9 VTBSP ①Pin	U/Price 1～9 VTBSB ②Bushing
12	7	23	7	14	—	—	6.5	3.5	M3 bolt	M4	1	VTBS (①+②Set)	20	25	1 3 5	Quotation		
					7.5	15					2			30				
15	8	28	9	17	—	—	8	5	M4 bolt	M5	1	VTBSP (①Pin)	25	25				
					7.5	15					2			30				
17	8	32	10	20	10	20	9	6	M5 bolt	M6		VTBSB (②Bushing)	30	40				
20	10	35	11	22			11	7	M6 bolt	M8			35	40				

■When using

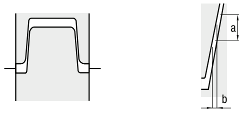




Mount the block set as shown in the figures. Make sure to provide the embedding hole with recesses as shown in the figure above.



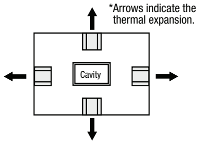
About mounting bolt hole: 1 or 2 As shown in the figure, the block can be easily removed by screwing a bolt into its tapping part to extract it.



(Value b to error a)

Angled \ a	0.1	0.3	0.5
1°	0.0018	0.005	0.009
3°	0.005	0.016	0.026

When the matching cone angle is large, the height of tapered pin and bushing must be adjusted so that they fit more tightly. On the other hand, it is necessary to take possible sticking of the pin and bushing into consideration when the angle is small. At 1° taper, (also 3° taper in some cases), sticking can be avoided by setting them slightly afloat as shown in the figure. When the angle is small, the creep of the height (a in the left drawing) against the width (b in the left drawings) also small so that there is no need to worry about positioning inaccuracies.



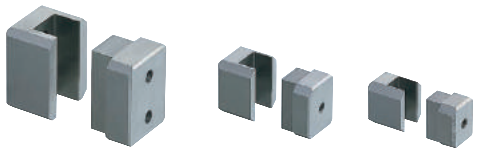
*Arrows indicate the directions of thermal expansion.

■The tapered block sets are capable of offsetting the plate's thermal expansion caused in high temperature molding processes for thermosetting resins, etc., thereby maintaining positioning accuracy. The pin type positioning method cannot thoroughly absorb thermal expansion when it takes place in directions as shown in the figure. The block type will be unaffected if the groove direction is in parallel to the directions of thermal expansion as shown in the drawing.

EXTRA PRECISION POSITIONING STRAIGHT BLOCK SETS

—PL INSTALLATION TYPE—

RoHS

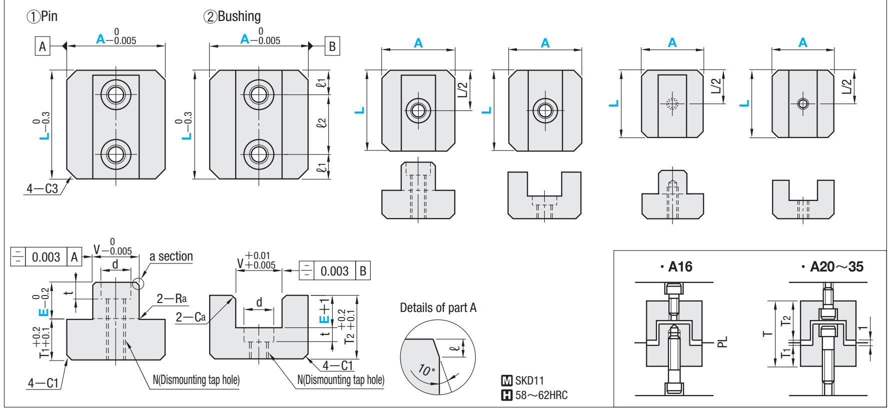


T V ①Pin	T V ②Bushing	Positioning precision (Clearance)	V dimension symmetry against A/B plane
0 −0.005	+0.01 +0.005	0.005 ~ 0.015	0.003 or less

■Mounting bolt hole: 2 (L30~50)

■Mounting bolt hole: 1 (L25)

■Mounting bolt hole:1 (L16・20)


①Pin
②Bushing
A
B
$A^{0}_{-0.005}$
$L^{0}_{-0.3}$
ℓ1
ℓ2
L/2
4−C3
0.003 A
$V^{0}_{-0.005}$
a section
$V^{+0.01}_{+0.005}$
0.003 B
d
t
2−Ra
2−Ca
$E^{0}_{-0.2}$
$T_1{}^{+0.2}_{+0.1}$
E^{+1}
$T_2{}^{+0.2}_{+0.1}$
4−C1
N(Dismounting tap hole)
Details of part A
ℓ
10°
・A16
・A20~35
PL
T
T1
T2
1

M SKD11
H 58~62HRC

V	T	T1	T2	ℓ	Ra	Ca	Bolt hole ℓ1	Bolt hole ℓ2	Bolt hole d	Bolt hole t	Installation bolts	Tap N	No. of bolt holes	Part Number Type	Part Number A	L Selection	E	U/Price 1~9
9	26	8	17	1	0.5	0.5	—	—	—	—	M4 bolt	M4	1 (Tap hole)	TBSF	16	16	8	Quotation
	30		21														12	
	26		17										1 (Tap hole)			20	8	
	30		21														12	
12	26		17						6.5	3.5	M3 bolt		1		20	25	8	
	30		21														12	
	26		17				7.5	15					2			30	8	
	30		21														12	
15	32	10	21	1	0.5	0.5	—	—	8	5	M4 bolt	M5	1		25	25	10	
	37		26	2	1	1											15	
	32		21	1	0.5	0.5	7.5	15					2			30	10	
	37		26	2	1	1											15	
17	36	12	23	1	0.5	0.5			9.5	6	M5 bolt	M6			30	30	12	
	44		31	2	1	1											20	
	36		23	1	0.5	0.5	10	20								40	12	
	44		31	2	1	1											20	
20	41		28	2	1	1			11	7	M6 bolt	M8			35	40	15	
	51		38														25	
	41		28					30								50	15	
	51		38														25	

Order

Part Number	—	L	—	E
TBSF20	—	25	—	8

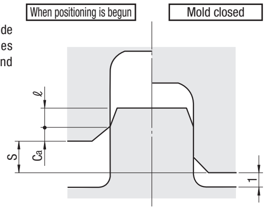
Price Quotation

Days to Ship Quotation

■When using

- When a convex side and a concave side knock against each other, it causes damage. Please open about 1mm and use it.

E	S (Effective length max.)
8	5.5
10	7.5
12	9.5
15	11.0
20	16.0
25	21.0


When positioning is begun
Mold closed
ℓ
S
Ca
1

■Characteristics

(Resemblance products to positioning straight block sets P.953)

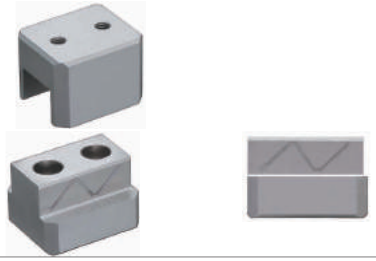
- Suitable for positioning in precision molds such as connector and electronic device.
- It is capable of preventing wear and damage in core pins since it can be positioned before core pins are inlayed on cavity.
- Use precision leader pins since clearance is fairly small.

EXTRA PRECISION POSITIONING STRAIGHT BLOCK SETS

—OIL GROOVE TYPE PL INSTALLATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

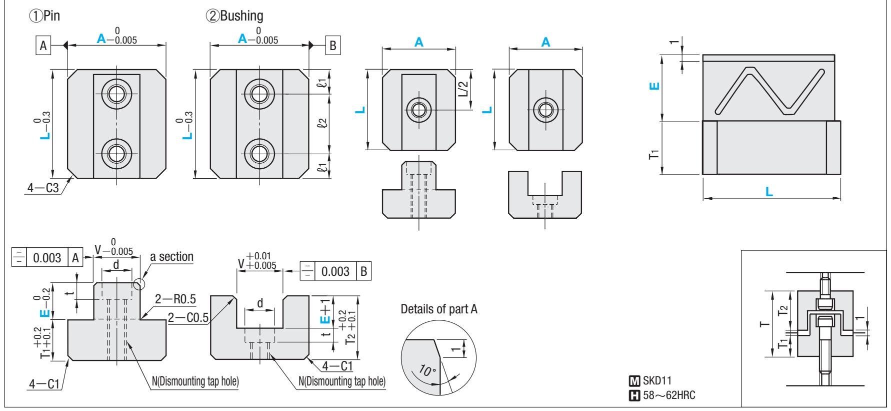


T V ①Pin	T V ②Bushing	Positioning precision (Clearance)	V dimension symmetry against A/B plane
0 −0.005	+0.01 +0.005	0.005 ~ 0.015	0.003 or less

■Mounting bolt hole: 2 (L30)

■Mounting bolt hole: 1 (L25)

■Oil groove configuration (Pin)


①Pin
②Bushing
A
B
$A^{0}_{-0.005}$
$L^{0}_{-0.3}$
ℓ1
ℓ2
L/2
4−C3
E
T1
L
1
0.003 A
$V^{0}_{-0.005}$
a section
$V^{+0.01}_{+0.005}$
0.003 B
d
t
2−R0.5
2−C0.5
$E^{0}_{-0.2}$
$T_1{}^{+0.2}_{+0.1}$
E^{+1}
$T_2{}^{+0.2}_{+0.1}$
4−C1
N(Dismounting tap hole)
Details of part A
10°
T
T1
T2

M SKD11
H 58~62HRC

V	T	T1	T2	Bolt hole ℓ1	Bolt hole ℓ2	Bolt hole d	Bolt hole t	Installation bolts	Tap N	Part Number Type	Part Number A	L Selection	E	U/Price 1~9 pcs.
12	26	8	17	—	—	6.5	3.5	M3 bolt	M4	TBSFM	20	25	8	Quotation
15	32	10	21			8	5	M4 bolt	M5		25	25	10	
				7.5	15							30	10	
17	36	12	23			9.5	6	M5 bolt	M6		30	30	12	

Order

Part Number	—	L	—	E
TBSFM25	—	25	—	10

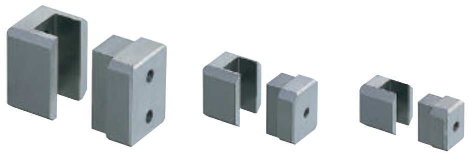
Price Quotation

Days to Ship Quotation

■Characteristics

- This type has two oil grooves, one on the sliding part and the other on the pin side of the straight locating block set(TBSF **Left page**).
- The oil grooves ensure that oil is fed to the sliding part, thus preventing the straight locating block set from scuffing or seizing.

EXTRA PRECISION POSITIONING STRAIGHT BLOCK SETS
—PL INSTALLATION TYPE—

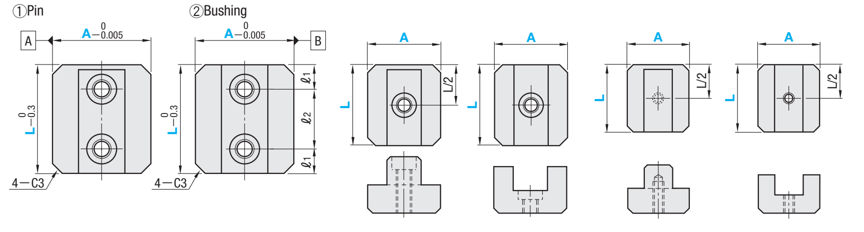


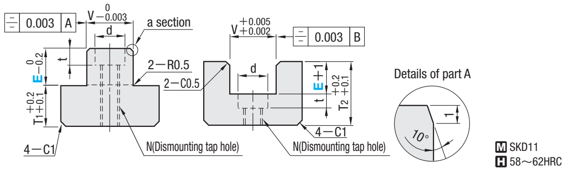
RoHS

T V		Positioning precision (Clearance)	V dimension symmetry against A/B plane
①Pin	②Bushing		
0 −0.003	+0.005 +0.002	0.002 ~ 0.008	0.003 or less

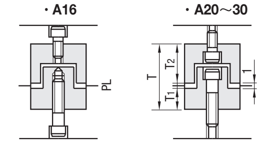
VTBSF

■Mounting bolt hole: 2 (L30・40) ■Mounting bolt hole:1 (L25) ■Mounting bolt hole:1 (L16・20)


①Pin
②Bushing
A
B
A−0.005
L−0.3
ℓ1
ℓ2
4−C3
L/2
L


0.003 A
V−0.003
a section
d
t
2−R0.5
2−C0.5
E−0.2
T1+0.1
4−C1
N(Dismounting tap hole)
V+0.005 +0.002
0.003 B
E+1
T2+0.1
4−C1
Details of part A
10°
1

M SKD11
H 58～62HRC


・A16
・A20～30
PL
T
T1
T2
1

V	T	T1	T2	Bolt hole				Installation bolts	Tap N	No. of bolt holes	Part Number		L Selection	E	U/Price
				ℓ1	ℓ2	d	t				Type	A			1～9 pcs.
9	26	8	17	—	—	—	—	M4 bolt	M4	1 (Tap hole)	VTBSF	16	16	8	Quotation
													20	8	
12						6.5	3.5	M3 bolt		1		20	25	8	
				7.5	15					2			30	8	
15	32	10	21	—	—	8	5	M4 bolt	M5	1		25	25	10	
				7.5	15					2			30	10	
17	36	12	23			9.5	6	M5 bolt	M6			30	30	12	
				10	20								40	12	

Order

Part Number	—	L	—	E
VTBSF20	—	25	—	8

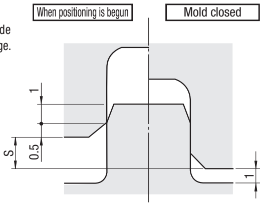
Price Quotation

Days to Ship Quotation

■When using

- When a convex side and a concave side knock against each other, it causes damage. Please open about 1mm and use it.

E	S (Effective length max.)
8	5.5
10	7.5
12	9.5


When positioning is begun
Mold closed
1
0.5
S
1

■Characteristics

(Resemblance products to positioning straight block sets P.953)

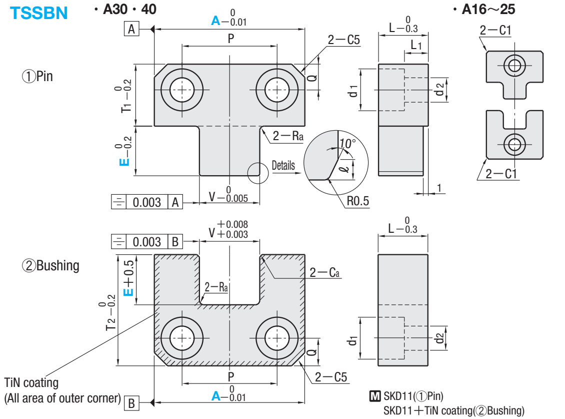
- Suitable for positioning in precision molds such as connector and electronic device.
- It is capable of preventing wear and damage in core pins since it can be positioned before core pins are inlayed on cavity.
- Use precision leader pins since clearance is fairly small.

SIDE STRAIGHT BLOCK SETS—TiN COATING—
—SIDE INSTALLATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

TSSBN


・A30・40
・A16～25
①Pin
②Bushing
A−0.01
P
2−C5
Q
T1−0.2
E−0.2
2−Ra
10°
ℓ
Details
R0.5
0.003 A
V−0.005
L−0.3
L1
d1
d2
2−C1
1
0.003 B
V+0.008 +0.003
E+0.5
T2−0.2
2−Ca
TiN coating
(All area of outer corner)
B

M SKD11(①Pin)
SKD11＋TiN coating(②Bushing)
H 53～56HRC<Annealing in high temperature>(①Pin&②Bushing)
2000HV～(②Bushing)

Dimension and tolerance mentioned in catalog represents after TiN coating processed.

T V		Positioning precision (Clearance)	V dimension symmetry against A/B plane
①Pin	②Bushing		
0 −0.005	+0.008 +0.002	0.003 ~ 0.013	0.003 or less

V	T1	T2	ℓ	Ra	Ca	Bolt hole				Installation bolts	L	L1	Part Number		E	U/Price
						P	Q	d1	d2				Type	A		1～9 pcs.
7	11	17	1	1	0.5	—	5	8	4.5	M4 bolt	8	3	TSSBN	16	6	Quotation
8														20	6	
10		19												25	8	
12	14	22				16	6	9.5	5.5	M5 bolt	10	4		30	8	
15	18	28				22	7	11	6.6	M6 bolt	13	6		40	10	

Order

Part Number	—	E
TSSBN20	—	6

Price Quotation

Days to Ship Quotation

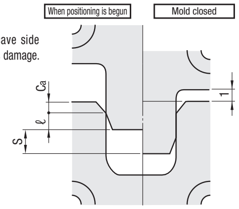
■Characteristics

- Suitable for positioning in precision molds such as connector and electronic device. It is capable of preventing wear and damage in core pins since it can be positioned before core pins are inlayed on cavity.
- Positioning is easily performed by simultaneously processing plates in piles (refer to refer to below drawing).
- Use precision leader pins since clearance is fairly small.

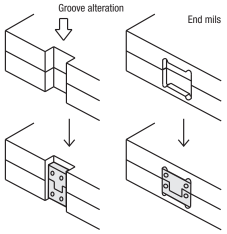
■When using

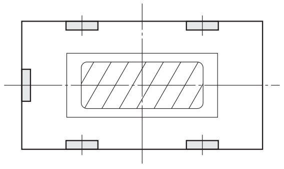
- When a convex side and a concave side knock against each other, it causes damage. Please open about 1mm and use it.

E	S (Effective length max.)
6	3.5
8	5.5
10	7.5


When positioning is begun
Mold closed
Ca
ℓ
S
1

Example


Groove alteration
End mils



A relatively large sized mold can be positioned more precisely using 2 of the block set at each side in longitudinal direction of the mold base.

■Guide for TiN Coating of Side Straight Block Sets

MISUMI TiN coating Side Straight Block Sets are processed by ion plating of PVD method. (Coating temperature : 480～500℃)

Following advantages can be available by TiN coating.
- TiN coating can prevent tight fitted trouble by improving frictional coefficient.
- Easier sliding movement by deterioration of dynamic friction coefficient.

Thickness of TiN coating is 2～3μ per side (Reference value).
Dimensional accuracy after TiN coating is ensured by preliminary calculating the coating thickness value at the time of processing.

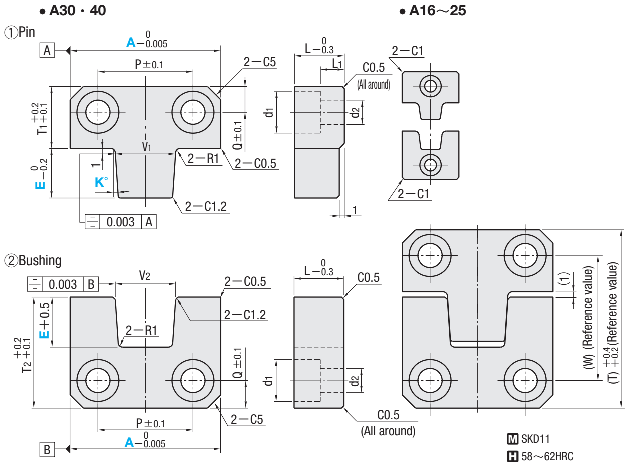
SIDE TAPERED BLOCK SETS

—SIDE INSTALLATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

TSST



• A30・40
• A16~25
①Pin
A
A $-^{0}_{0.005}$
P±0.1
2−C5
$T_1{}^{+0.2}_{+0.1}$
V1
Q±0.1
E $^{0}_{-0.2}$
1
K°
2−R1
2−C0.5
2−C1.2
0.003 A
L $-^{0}_{0.3}$
L1
C0.5
(All around)
d1
d2
1
2−C1
2−C1
②Bushing
0.003 B
V2
2−C0.5
2−C1.2
E+0.5
$T_2{}^{+0.2}_{+0.1}$
2−R1
Q±0.1
P±0.1
A $-^{0}_{0.005}$
B
2−C5
L $-^{0}_{0.3}$
C0.5
d1
d2
C0.5
(All around)
(1)
(W) (Reference value)
(T) $^{+0.4}_{+0.2}$ (Reference value)

M SKD11
H 58~62HRC

V1	V2	T1	T2	(T)	(W)	Hold the rubber Bolt	L	L1	Bolt hole				Part Number		E	K°	U/Price
									P	Q	d1	d2	Type	A			1~9 pcs.
7	7	11	17	29	19	M4	8	3	—	5	8	4.5	TSST	16	6	1 3	Quotation
8	8													20	6		
10	10		19	31	21									25	8		
12	12	14	22	37	25	M5	10	4	16	6	9.5	5.5		30	8		
15	15	18	28	47	33	M6	13	6	22	7	11	6.6		40	10		

Order

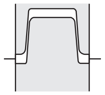
Part Number	—	E	—	K
TSST20	—	6	—	1

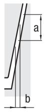
Days to Ship Quotation

Price Quotation

■When using

- Positioning is easily performed by simultaneously processing plates in piles.





(Value b to error a)

Angle \ a	0.1	0.3	0.5
1°	0.0018	0.005	0.009
3°	0.005	0.016	0.026

When the matching cone angle is large, the height of tapered pin and bushing must be adjusted so that they fit more tightly. On the other hand, it is necessary to take possible sticking of the pin and bushing into consideration when the angle is small. At 1° taper (also 3° taper in some cases), sticking can be avoided by setting them slightly afloat as shown in the figure.
When the angle is small, the creep of the height (a in the left drawing) against the width (b in the left drawings) also small so that there is no need to worry about positioning inaccuracies.

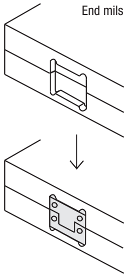
- Use after adjusting the height direction matching with the actual part.

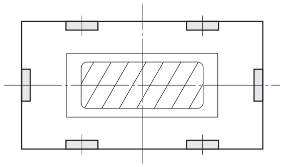
■Characteristics

- It is capable of preventing wear and damage in core pins since it can be positioned before core pins are inlayed on cavity.
- Positioning is possible through the tapered-type side mounting blocks.

ex **Example**

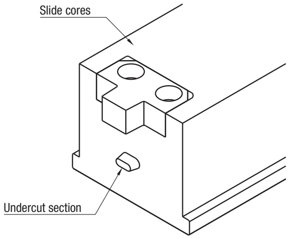
- It is recommended to carry out adjustment of height direction through pocket process of end milling.



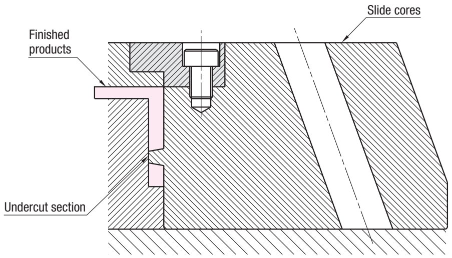


A relatively large sized mold can be positioned more precisely using 2 of the block set at each side in longitudinal direction of the mold base.

- This product can also be used for slide positioning.



Slide cores
Undercut section



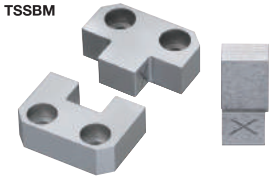
Slide cores
Finished products
Undercut section

SIDE STRAIGHT BLOCK SETS

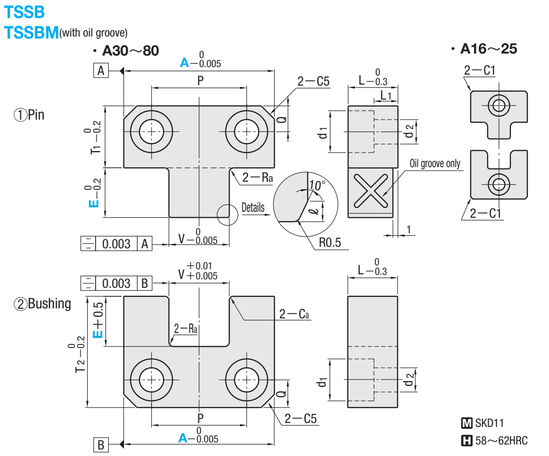
— SIDE INSTALLATION TYPE ／ **OIL GROOVE TYPE** SIDE INSTALLATION TYPE —

TSSB RoHS

TSSBM



T V		Positioning precision (Clearance)	V dimension symmetry against A/B plane
①Pin	②Bushing		
0 −0.005	+0.01 +0.005	0.005 ~ 0.015	0.003 or less



TSSB
TSSBM(with oil groove)
・A30～80
・A16～25
①Pin
②Bushing
A
B
P
Q
2－C5
2－C1
2－Ra
2－Ca
R0.5
10°
ℓ
Details
Oil groove only
0.003 A
0.003 B
E+0.5
L
L1
d1
d2
1

M SKD11
H 58～62HRC

V	T_1	T_2	ℓ	R_a	C_a	Bolt hole				Installation bolts	L	L_1	Part Number		E	U/Price
						P	Q	d_1	d_2				Type	A		1～9 pcs.
7	11	17	1	1	0.5	—	5	8	4.5	M4 bolt	8	3	TSSB	16	6	Quotation
8														20	6	
10		19												25	8	
12	14	22	1	1	0.5	16	6	9.5	5.5	M5 bolt	10	4		30	8	
		34	2	2	1										20	
15	18	28	1	1	0.5	22	7	11	6.6	M6 bolt	13	6		40	10	
		43	2	2	1										25	
25	30	50	2	2	1	36	12	14	8.6	M8 bolt	20	11		60	20	
		65													35	
30	40	70				52	14	18	11	M10 bolt	25	14		80	30	
		85													45	

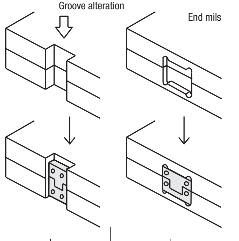
V	T_1	T_2	ℓ	R_a	C_a	Bolt hole				Installation bolts	L	L_1	Part Number		E	U/Price
						P	Q	d_1	d_2				Type	A		1～9 pcs.
12	14	22	1	1	0.5	16	6	9.5	5.5	M5 bolt	10	4	TSSBM (with oil groove)	30	8	Quotation
15	18	28	1	1	0.5	22	7	11	6.6	M6 bolt	13	6		40	10	

Order Part Number — E
TSSB20 — 6

Price Quotation

Days to Ship Quotation

Example



Groove alteration
End mils

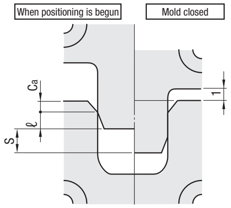
■Characteristics

- Suitable for positioning in precision molds such as connector and electronic device. It is capable of preventing wear and damage in core pins since it can be positioned before core pins are inlayed on cavity.
- Positioning is easily performed by simultaneously processing plates in piles (refer to drawing on the right)
- Use precision leader pins since clearance is fairly small.
- Oil groove type (TSSBM) is obtained by attaching oil groove at the sliding part of the side straight block set (TSSB) and two places on both sides of the pin.
- The oil grooves ensure that oil is fed to the sliding part, thus preventing the straight locating block set from scuffing or seizing.

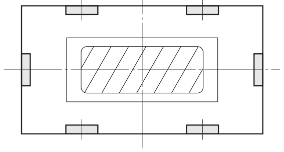
■When using

- When a convex side and a concave side knock against each other, it causes damage. Please make a 1mm gap and use it.

E	S (Effective length max.)
6	3.5
8	5.5
10	7.5
20	16.0
25	21.0
30	26.0
35	31.0
45	41.0



When positioning is begun
Mold closed
Ca
ℓ
S
1



A relatively large sized mold can be positioned more precisely using 2 of the block set at each side in longitudinal direction of the mold base.

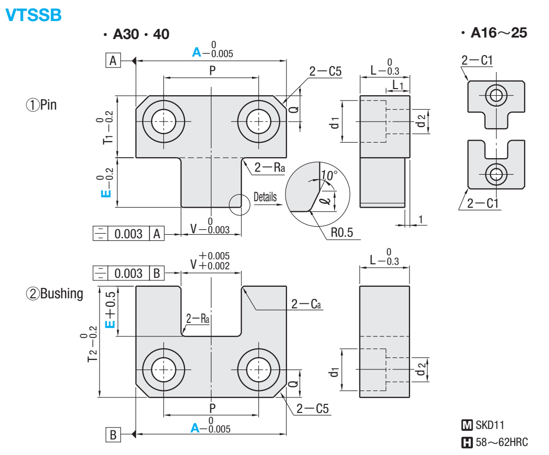
EXTRA PRECISION SIDE STRAIGHT BLOCK SETS

— SIDE INSTALLATION TYPE —

Non JIS material definition is listed on P.1351 - 1352

RoHS

T V		Positioning precision (Clearance)	V dimension symmetry against A/B plane
①Pin	②Bushing		
0 −0.003	+0.005 +0.002	0.002 ~ 0.008	0.003 or less



VTSSB
・A30・40
・A16～25
①Pin
②Bushing
A
B
P
Q
2－C5
2－C1
2－Ra
2－Ca
R0.5
10°
ℓ
Details
0.003 A
0.003 B
E+0.5
L
L1
d1
d2
1

M SKD11
H 58～62HRC

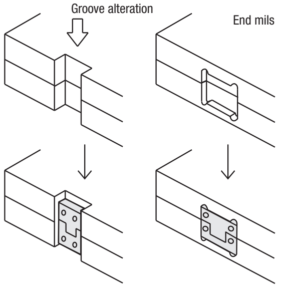
V	T_1	T_2	ℓ	R_a	C_a	Bolt hole				Installation bolts	L	L_1	Part Number		E	U/Price
						P	Q	d_1	d_2				Type	A		1～9 pcs.
7	11	17	1	1	0.5	—	5	8	4.5	M4 bolt	8	3	VTSSB	16	6	Quotation
8														20	6	
10		19												25	8	
12	14	22				16	6	9.5	5.5	M5 bolt	10	4		30	8	
15	18	28				22	7	11	6.6	M6 bolt	13	6		40	10	

Order Part Number — E
VTSSB20 — 6

Price Quotation

Days to Ship Quotation

Example



Groove alteration
End mils

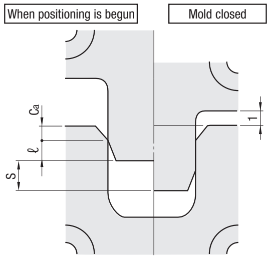
■Characteristics

- Suitable for positioning in precision molds such as connector and electronic device. It is capable of preventing wear and damage in core pins since it can be positioned before core pins are inlayed on cavity.
- Positioning is easily performed by simultaneously processing plates in piles (refer to drawing on the right)
- Use precision leader pins since clearance is fairly small.

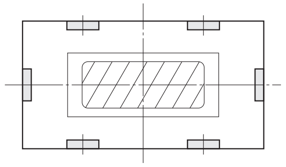
■When using

- When a convex side and a concave side knock against each other, it causes damage. Please open about 1mm and use it.

E	S (Effective length max.)
6	3.5
8	5.5
10	7.5



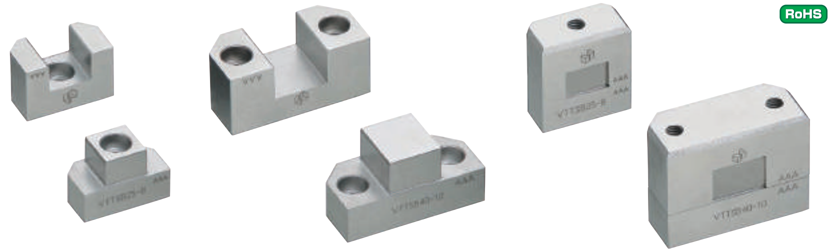
When positioning is begun
Mold closed
Ca
ℓ
S
1



A relatively large sized mold can be positioned more precisely using 2 of the block set at each side in longitudinal direction of the mold base.

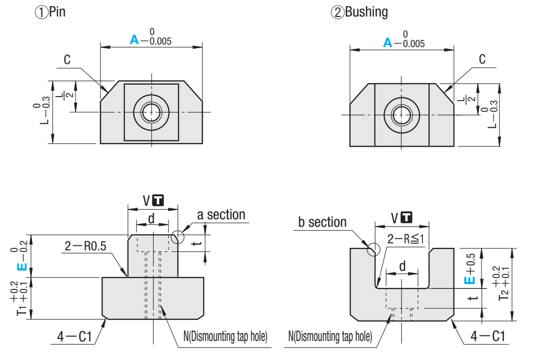
POSITIONING STRAIGHT BLOCK SETS

—PL INSTALLATION・L DIMENSION SHORT TYPE—



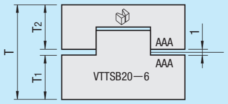
Group	Part Number	T V		Positioning precision (Clearance)	V dimension symmetry against A plane	M	H
		①Pin	②Bushing				
Precision	**TTSB**	0 −0.005	+0.01 +0.005	0.005～0.015	0.003 or less	SKD11	58～62HRC
Extra Precision	**VTTSB**	0 −0.003	+0.003 0	0.006 or less	(Match mark type)		

● A20・25・30

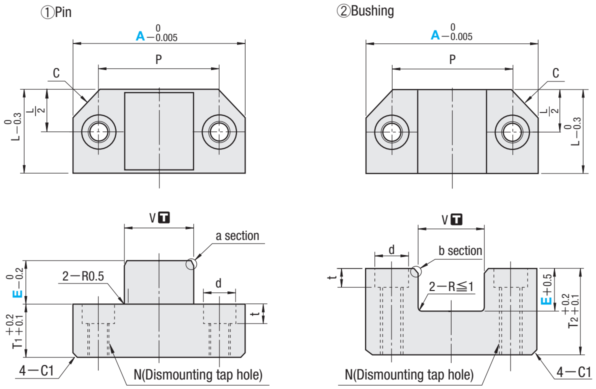

①Pin
②Bushing
A 0 −0.005
C
L/2
L 0 −0.3
V T
d
a section
b section
2−R0.5
2−R≦1
t
E 0 −0.2
E +0.5
T1 +0.2 +0.1
T2 +0.2 +0.1
4−C1
N(Dismounting tap hole)

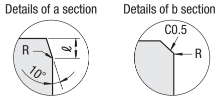
About identification mark of extra precision (VTTSB)

- Dimension A is finished by processing the pin and bushing united.
- Do use it by the same combination matching the direction of identification mark.


T
T2
T1
t
AAA
AAA
VTTSB20−6

● A40・50


①Pin
②Bushing
A 0 −0.005
P
C
L/2
L 0 −0.3
V T
a section
b section
2−R0.5
2−R≦1
d
t
E 0 −0.2
E +0.5
T1 +0.2 +0.1
T2 +0.2 +0.1
4−C1
N(Dismounting tap hole)


Details of a section
Details of b section
R
ℓ
10°
C0.5
R

Non JIS material definition is listed on P.1351 - 1352

L	T	T1	T2	V	ℓ	C	P	Bolt hole d	Bolt hole t	Installation bolts	Tap N	Part Number Type	Part Number A	E
12	23	8	14	10	0.5	4	—	6.5	3.5	M3 bolt	M4	TTSB VTTSB	20	6
15	28	10	17	12	1			8	4.5	M4 bolt	M5		25	8
						6							30	8
20	32	12	19	15			28						40	10
	43	17	25		2									15
25	46		28	20			35	9.5	5.5	M5 bolt	M6		(50)	15

A50 is available for precision TTSB only.

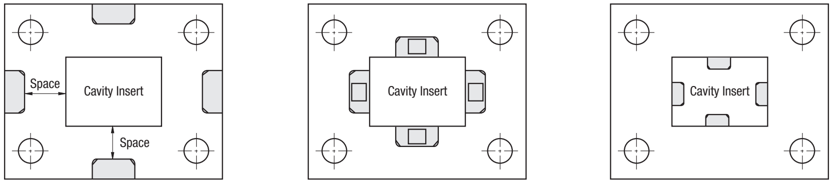
Order

Part Number	—	E
TTSB20	—	6

Days to Ship Quotation

Price Quotation

Example Similar products to positioning straight block sets P.945


Space
Cavity Insert
Space
Cavity Insert
Cavity Insert

Characteristics

Spaces may be taken on insert cavity direction even for no-space molds and small molds.

To position the surrounding of insert cavity, adds relieves on two sides of pin.

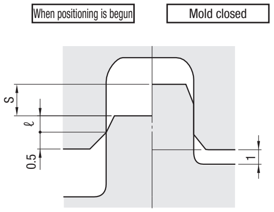
The line-up of positioning precision and size is done, which can also be used in positioning insert cavity.

- Suitable for positioning in precision molds such as connector and electronic device.
- It is capable of preventing wear and damage in core pins since it can be positioned before core pins and such are inlayed on cavity.
- Use precision leader pins since clearance is fairly small.

When using

- When a convex side and a concave side knock against each other, it causes damage. Please make a 1mm gap and use it.
- For VTTSB, clearance of pin and bushing is small and dimension A is finished by processing the pin and bushing united. Take great care of plate processing.
- VTTSB is not applicable to the mold that counterchanges pin and bushing by rotating the mold such as done in 2-color molding.

E	S (Effective length max.)
6	4.0
8	5.5
10	7.5
15	11.5


When positioning is begun
Mold closed
S
ℓ
0.5
1

POSITIONING BLOCK SETS

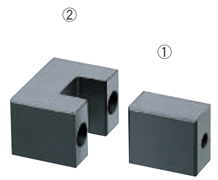
—STRAIGHT TYPE—

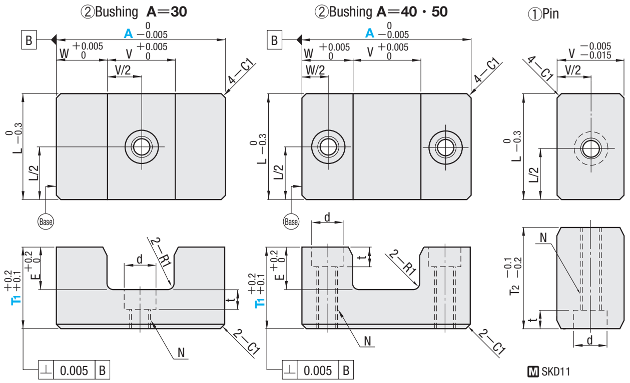
SIDE COTTER BLOCK

Non JIS material definition is listed on P.1351 - 1352

RoHS

LBJX(①+②Set)
LBJXP (①Pin)
LBJXB (②Bushing)





②Bushing A=30
②Bushing A=40・50
①Pin
B
A
W
V
V/2
W/2
4-C1
L
L/2
Base
d
2-R1
T1
E
t
N
2-C1
T2
0.005 B

M SKD11
H 58～62HRC

W	V	E	T2	d	t	Installation bolts	Tap N	L	Part Number Type	Part Number A	T1	U/Price 1～9 LBJX (①+②Set)	U/Price 1～9 LBJXB (②Bushing)
9	12	6	18	8	4.5	M4	M5	20	LBJX (①+②Set) LBJXB (②Bushing)	30	14	Quotation	
											19		
12	16	10	25					25		40	19		
											24		
15	20	15	35	11	6.5	M6	M8	30		50	29		
											34		

Part Number Type	Part Number A	U/Price 1～9 LBJXP (①Pin)
LBJXP (①Pin)	30	Quotation
	40	
	50	

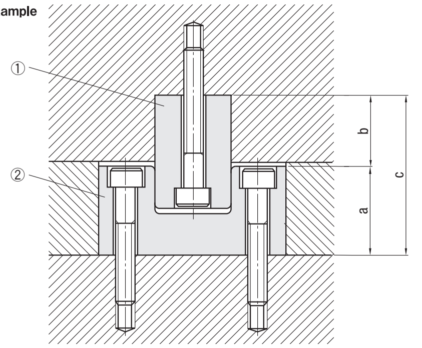
Order

Part Number	—	T1
LBJX 40	—	19
LBJXP30		
LBJXB50	—	29

Price Quotation

Days to Ship Quotation

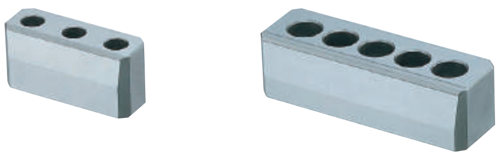
Example



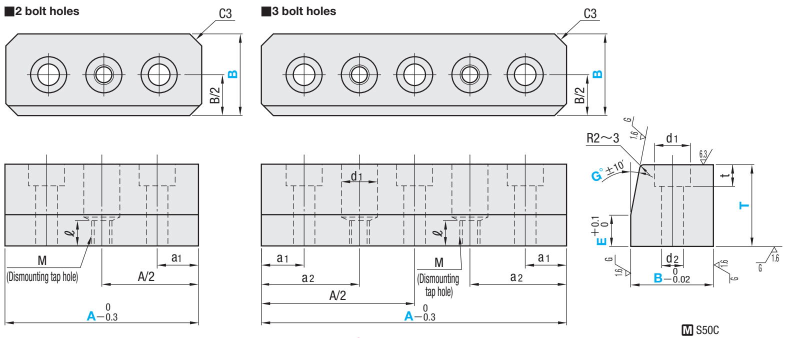
Part Number	—T1	a	b	c
LBJX	30—14	14	13	27
	30—19	19		32
	40—19		16	35
	40—24	24		40
	50—29	29	21	50
	50—34	34		55

- ②(Bushing) in LBJX30 and LBJXB30 are to be installed by one bolt.

RoHS



LKWN



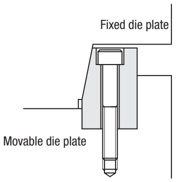
■2 bolt holes
■3 bolt holes
C3
B
B/2
ℓ
M
(Dismounting tap hole)
a1
a2
A/2
A
R2～3
d1
d2
G°
E
T
t

M S50C
H 38～45HRC

ℓ=M×1

M	d1	d2	t	a1	a2	No. of bolt holes	Part Number Type	Part Number B	T	A	E	G°	U/Price 1～9 pcs.
M 6	11	6.6	6.5	10	—	2	LKWN	20	14	60	5	5	Quotation
					25	3				80			
					30					100			
M 5	9.5	5.5	6		—	2			29	50 60 80	15		
M 6	11	6.6	6.5	15				25	29	60 80 100	15		
									39	60 80 100			
M 8	14	8.6	8.6					30	29	80	10 15		
					32.5	3				100			
					45					150			
					57.5					200			
					70					250			
M10	18	11	11	20	—	2		40	39	100	15	10	
					47.5	3				150			
					60					200			
					72.5					250			
M12	20	13	13		—	2		50	44	100	20		
					47.5	3				150			
					60					200			
					72.5					250			

Example



Fixed die plate
Movable die plate

Order

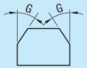
Part Number	—	T	—	A	—	E	—	G
LKWN30	—	29	—	A100	—	E15	—	G5

Price Quotation

Days to Ship Quotation

Alterations

Part Number	—	T	—	A	—	E	—	G	—	(GC)
LKWN 30	—	29	—	A100	—	E15	—	G5	—	GC

Alteration	Code	Spec.	1Code
	GC	Tapers on both side(in angle G against B dimension).	Quotation

COMPONENTS OF EJECTOR SPACE

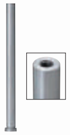
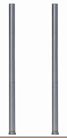
COMPONENTS OF EJECTOR SPACE

Product Name Part Number	Precision Ejector Leader Pins—Inlay type— EGH	—Striking type— EGHC	—Striking type— EGHN	—C ring type— EGHR	Ejector Leader Pins EGPD	 EGPP
Page	967	968	968	969	970	970

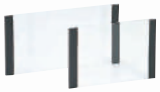
Precision Ejector Leader Pins—Bolt fixing counterbore type— EGZA	—Bolt type— EGHA	Ejector Leader Pins for Middle/Large Mold—Stepped type— EGPDX	—Bolt hole type— EGPDHE EGPDHF	Ejector Leader Bushings—Plain type— EGBH	—Long S dimension type— EGBN
971	972	973	973	974	974

—Oil-free type— EGBHZ	—Copper alloy・oil-free type— EGBZS	—High temperature use・Copper alloy・oil-free type— EGBPK	—Long S dimension・oil-free type— EGBNZ	—Long S dimension/Copper alloy・oil-free type— EGBZ	—High temperature use/Long S dimension/Copper alloy・oil-free type— EGBSK
975	975	975	976	976	976

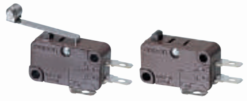
—Linear guide type・Steel/Stainless— EGBL EGBLT EGBLS	 EGBS EGBW	Ejector Leader Bushings—Ball type— EGBB	Ball Retainers EMBS	Return Pins—Blank type— RP□TH RP□TJ	—L dimension designation type— RP□TL RP□TV RP□TZ
977	978	979	980	983	985

—L dimension designation with tap hole type— RP□TLM RP□TVM RP□TZM	Return Pins for Middle・Large Mold RP8TX□	 RP8TSM	Early Return Units for Ejector Plate ERST	Bolts for Ejector Plate Set EPB	Support Pillars—Tapped type— SPL
987	989	990	993	996	997



—Dowel hole type— SPLG	—Bolt hole type— DSPL DSF	—Fully quenched type— HSP HSPL	Stepped Support Pillars SPLF	Stroke Adjustment Collars SPLC	Covers for Ejector Space AEC
999	1001	1003	1004	1005	1005



Spacer Rings SPW SPWG SPWD	Stopper Rings STR STPB	Stopper Pins STPH STPN	Ejector Rods ERDW CBW	—L dimension designation type— ERDFF ERDFX	Ejector Plate Return Detection Switches EGS EGS—V
1006	1006	1006	1007	1008	1009

Ejector Plate Return Detection Switches EPRSR—24V	Ejector Plate Return Detection Switches EPRS—24VT	Cables for Detection Switches EPRSC	Ejector Plate Return Detection Switches EGSM	 EGSP
1011	1012	1012	1013	1013

■Guide of Gas Springs for Plastic Mold

Gas springs for plastic mold were standardized. Valid for ejector plate return.

MBPGS—A
MBPGS—B

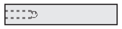
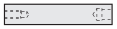
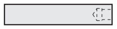
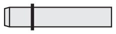
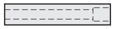
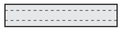
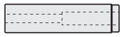
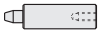
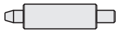
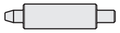
P.1267

MBPGS—H

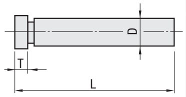
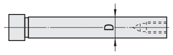
P.1268

GUIDE FOR COMPONENTS OF EJECTOR SPACE

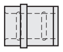
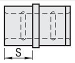
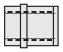
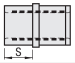
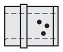
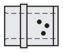
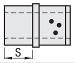
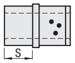
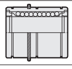
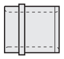
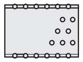
Ejector Leader Pins

Shape		Part Number	Applicable bushings	Page
Inlay type (with tap)		EGH	Plain type Oil-free type Copper alloy・oil-free type Linear guide type Ball type	P.961
Striking type (with tap and dowel hole)		EGHC	Plain type Oil-free type Copper alloy・oil-free type Linear guide type Ball type	P.962
Striking type (with dowel hole)		EGHN	Plain type Oil-free type Copper alloy・oil-free type Linear guide type Ball type	P.962
C ring type		EGHR	Plain type Oil-free type Copper alloy・oil-free type Linear guide type Ball type	P.963
Bolt fixing counterbore type		EGZA	Plain type Oil-free type Copper alloy・oil-free type Linear guide type Ball type	P.965
Through bolt hole type		EGHA	Plain type Oil-free type Copper alloy・oil-free type Linear guide type Ball type	P.966
Bolt hole type		EGPDHE EGPDHF	Plain type Oil-free type Copper alloy・oil-free type	P.967
Single end stepped type Single end tapped type		EGPP	Plain type Oil-free type Copper alloy・oil-free type	P.964
Both ends stepped type		EGPD	Plain type Oil-free type Copper alloy・oil-free type	P.964
Both ends stepped type for large mold		EGPDX	Plain type Oil-free type Copper alloy・oil-free type	P.967

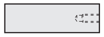
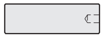
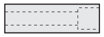
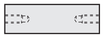
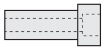
Return Pins

Shape	T (head thickness)	D tolerance	Part Number	Page
 T D L	$4^{0}_{-0.05}$	Df6	RP4TH	P.977
			RP4TJ	
			RP4TL	P.979
			RP4TV	
			RP4TZ	
	$8^{0}_{-0.1}$	Df6	RP8TH	P.977
			RP8TJ	
			RP8TL	P.979
			RP8TV	
			RP8TZ	
		De7	RP8TXE	P.983
		Df6	RP8TXF	
		$D^{-0.1}_{-0.3}$	RP8TSM	P.984
	$10^{0}_{-0.1}$	Df6	RP10TL	P.979
 D	$4^{0}_{-0.05}$	Df6	RP4TLM	P.981
			RP4TVM	
			RP4TZM	
	$8^{0}_{-0.1}$		RP8TLM	
			RP8TVM	
			RP8TZM	
	$10^{0}_{-0.1}$		RP10TLM	

Ejector Leader Bushings

Shape		Part Number	Type	Page
Plain type		EGBH	Standard type	P.968
	 S	EGBN	Long S dimension type	P.968
Oil-free type		EGBHZ	Standard type	P.969
	 S	EGBNZ	Long S dimension type	P.970
Copper alloy・oil-free type		EGBPK	For High temperature use	P.969
		EGBZS	Standard type	P.969
	 S	EGBZ	Long S dimension type	P.970
	 S	EGBSK	For High temperature use Long S dimension type	P.970
Linear guide type		EGBL EGBLT EGBLS	Built-in ball type	P.971
Ball retainer type		EGBB	Special bushings (ball type)	P.973
		EMBS	Ball Retainers	P.974

Support Pillars

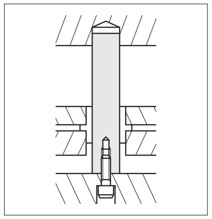
Shape		Application	Part Number	Page
Tapped type		ϕ12～ϕ120	SPL	P.991
Dowel hole type		ϕ20～ϕ 50	SPLG	P.993
Bolt hole type		ϕ16～ϕ 80	DSPL	P.995
		ϕ16～ϕ120	DSF	
Fully quenched type		ϕ 6～ϕ 20	HSP	P.997
			HSPL	
Stepped type		ϕ20～ϕ 50	SPLF	P.998

EXAMPLE FOR EJECTOR LEADER PINS AND BUSHINGS

Example For Ejector Leader Pins And Bushings

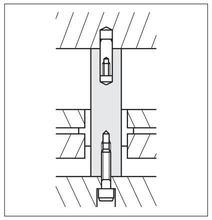
● Inlay method

※This method requires a high precision machining of the ejector pin's bushing hole and the back up plate's inlay hole to have them aligned accurately.

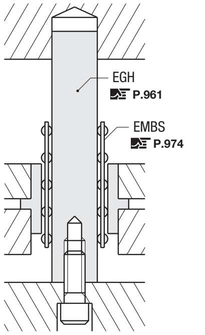


● Striking method

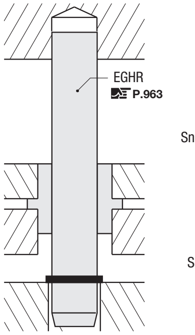
1. Use of a long pin helps prevent deflection at the time of striking.
2. Can also serve as a support pillar, requiring less space.



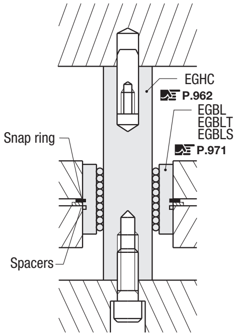
(1) Pin: Inlay type
(with a tap)
Bushing: Ball type



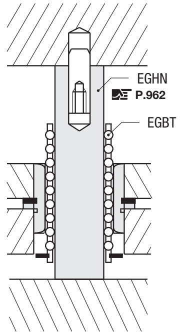
(2) Pin: Inlay type
(with a C ring)
Bushing: Plain type
Oil-free type
Copper alloy・oil-free type



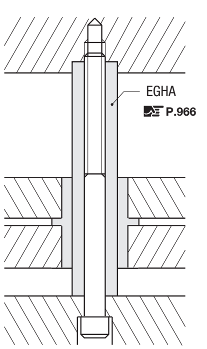
(3) Pin: Striking type
(with a tap and dowel hole)
Bushing: Linear guide type



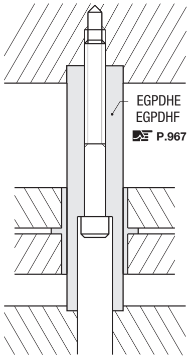
(4) Pin: Striking type
(with a dowel hole)
Bushing: Ball type



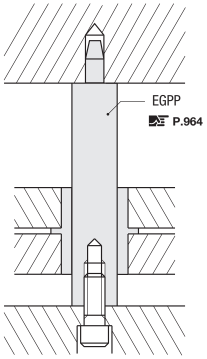
(5) Pin: Through bolt hole type
Bushing: Plain type
Oil-free type
Copper alloy・oil-free type



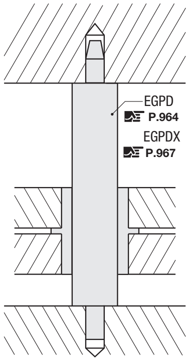
(6) Pin: Bolt hole type
Bushing: Plain type
Oil-free type
Copper alloy・oil-free type



(7) Pin: Stepped end＋tapped end type
Bushing: Plain type
Oil-free type
Copper alloy・oil-free type



(8) Pin: Both ends stepped type
Bushing: Plain type
Oil-free type
Copper alloy・oil-free type

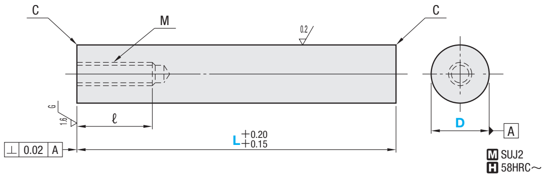


PRECISION EJECTOR LEADER PINS

—INLAY TYPE—

RoHS

EGH



D	C
6~30	0.5
32~50	1.0

M SUJ2
H 58HRC~
(Induction hardening on D30 or larger)

Squareness of the end face is made 0.02mm or less.

D		M × Pitch	ℓ	Part Number		L	U/Price
				Type	D	5mm increments	1~9
6	−0.010 −0.015	M4×0.7	8	EGH	6	30~ 70	
						75~ 80	
8	−0.015 −0.020	M5×0.8	10		8	30~ 70	
						75~100	
10					10	30~ 70	
						75~100	
12	−0.020 −0.025	M6×1.0	12		12	40~ 70	
						75~100	
13					13	40~ 70	
						75~100	
						105~125	
						130~150	
16					16	40~ 70	
						75~100	
						105~125	
						130~150	
20	−0.025 −0.030	M8×1.25	16		20	40~ 70	
						75~ 90	
						95~110	
						115~130	
						135~150	
						155~175	
25					25	50~ 70	Quotation
						75~ 90	
						95~110	
						115~130	
						135~150	
						155~170	
						175~200	
						205~225	
						230~250	
30		M10×1.5	20		30	50~ 70	
						75~ 90	
						95~110	
						115~130	
						135~150	
						155~170	
						175~200	
						205~225	
						230~250	
						255~275	
						280~300	
32					32	50~ 70	
						75~ 90	
						95~110	
						115~130	
						135~150	
						155~170	
						175~200	
						205~225	
						230~250	
						255~275	
						280~300	

D		M × Pitch	ℓ	Part Number		L	U/Price
				Type	D	5mm increments	1~9
35	−0.025 −0.030	M10×1.5	20	EGH	35	50~ 70	
						75~ 90	
						95~110	
						115~130	
						135~150	
						155~170	
						175~200	
						205~225	
						230~250	
						255~275	
						280~300	
40					40	50~ 70	
						75~ 90	
						95~110	
						115~130	Quotation
						135~150	
						155~170	
						175~200	
						205~225	
						230~250	
						255~275	
						280~300	
						305~325	
						330~350	
50					50	50~ 70	
						75~ 90	
						95~110	
						115~130	
						135~150	
						155~170	
						175~200	
						205~225	
						230~250	
						255~275	
						280~300	
						305~325	
						330~350	

Order Part Number — L
EGH25 — 75

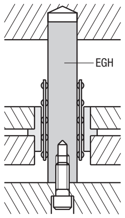
Days to Ship Quotation

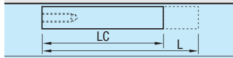
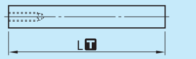
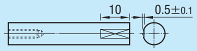
Price Quotation

Alterations Part Number — L (LC) — (LKC · LKV · AVC)
EGH30 — LC129.9 — LKC

Example

Pin: Inlay type
(with a tap)
Bushing: Ball type
P.973



Alterations	Code	Spec.	1Code
	LC	Changes the full length. LC=0.1mm increments Lmin.<LC<Lmax.	Quotation
	LKC	Changes the full length tolerance. $L^{+0.20}_{+0.15}$ ··· L≦200 ··· $^{+0.02}_{0}$ 200<L≦350 ··· $^{+0.03}_{0}$	
	LKV	Changes the full length tolerance. $L^{+0.20}_{+0.15}$ ··· $^{+0.01}_{0}$ ⊗Not applicable to L>150 Combining LC makes designation of LC0.01mm increments possible.	
	AVC	Air vent machining All D dimensions ··· Groove depth: 0.5±0.1 Groove width: 10±0.5	

All pieces are ground together when 4 pieces or less are ordered for LKC · LKV (Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range.)

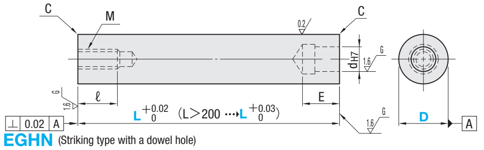
PRECISION EJECTOR LEADER PINS

—STRIKING TYPE—

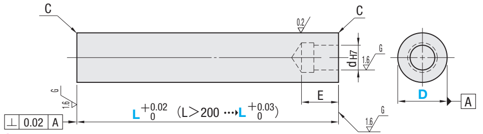
Non JIS material definition is listed on P.1351 - 1352

RoHS

EGHC (Striking type with a tap and dowel hole)



EGHN (Striking type with a dowel hole)



Squareness of the end face is made 0.02mm or less.
Comes with a dowel pin MSTH (h7) that has a negative tolerance value.

D	C
8~30	0.5
32~50	1.0

Supplied Dowel Pins

D	Dowel Pins
8 10	MSTH 5—25
12 13 16	MSTH 6—30
20	MSTH 8—40
25	MSTH 10—40
30 32	MSTH 13—50
35 40 50	MSTH 16—50

M SUJ2
H 58HRC~
(Induction hardening on D30 or larger)
A Dowel pin

D		M × Pitch	ℓ	dH7		E	Part Number		L	U/Price 1~9	
							Type	D	5mm increments	EGHC	EGHN
8	−0.015 −0.020	M5×0.8	10	5	+0.012 0	12	EGHC	8	40~ 70		
									75~ 80		
10							EGHC EGHN	10	40~ 70		
									75~100		
12	−0.020 −0.025	M6×1.0	12	6		15		12	40~ 70		
									75~100		
13								13	40~ 70		
									75~100		
									105~125		
									130~150		
16								16	40~ 70		
									75~100		
									105~125	Quotation	
									130~150		
20	−0.025 −0.030	M8×1.25	16	8	+0.012 0	20		20	50~ 90		
									95~120		
									125~150		
									155~175		
25				10				25	50~ 90		
									95~120		
									125~150		
									155~200		
									205~230		
									235~250		
30		M10×1.5	20	13	+0.018 0	25		30	50~ 90		
									95~120		
									125~150		
									155~200		
									205~230		
									235~250		
									255~275		
									280~300		

D		M × Pitch	ℓ	dH7		E	Part Number		L	U/Price
							Type	D	5mm increments	1~9
32	−0.025 −0.030	M10×1.5	20	13	+0.018 0	25	EGHC	32	50~ 90	
									95~120	
									125~150	
									155~200	
									205~250	
									255~275	
									280~300	
35				16				35	50~120	
									125~150	
									155~200	
									205~250	
									255~275	
									280~300	Quotation
40								40	50~120	
									125~150	
									155~220	
									225~250	
									255~275	
									280~300	
									305~325	
									330~350	
50								50	50~120	
									125~150	
									155~220	
									225~250	
									255~275	
									280~300	
									305~325	
									330~350	

A center hole may be one side of EGHN.

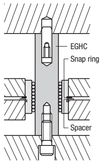
Order Part Number — L
EGHC30 — 130

Days to Ship Quotation

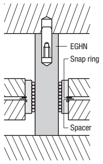
Price Quotation

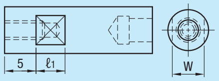
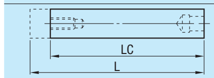
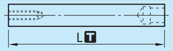
Alterations Part Number — L (LC) — (SC · LKV)
EGHC30 — LC129.9 — SC

Pin: Striking type
(with a tap and dowel hole)
Bushing: Linear guide type
P.971



Pin: Striking type
(with a dowel hole)
Bushing: Linear guide type
P.971



Alterations	Code	Spec.	1Code
	SC	Adds grooves for wrenching. Available for D≧10 D / W / ℓ1: 10 / 8 / 8; 12 / 8 / 8; 13 / 8 / 8; 16 / 13 / 10; 20 / 17 / 10; 25 / 22 / 10; 30 / 27 / 15; 32 / 27 / 15; 35 / 30 / 15; 40 / 36 / 20; 50 / 46 / 20	Quotation
	LC	Changes the full length. LC=0.1mm increments Lmin.<LC<Lmax. The tap length becomes shorter by (standard L−LC) since this alteration cuts a standard length piece (5mm increments).	
	LKV	Changes the full length tolerance. $L^{+0.02}_{0}$ ··· $^{+0.01}_{0}$ ⊗ Not applicable to L>150 Combining LC makes designation of LC0.01mm increments possible.	

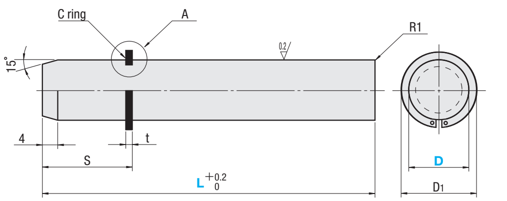
PRECISION EJECTOR LEADER PINS

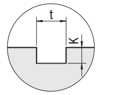
—C RING TYPE—

RoHS

EGHR

A section: details of C ring groove





■Dimensions of accessory C ring

Application	Int. Dia.	Ext.dia.	Thickness
D10	9.3	13.3	1
D13	12	16.6	1
D16	14.7	19.7	1
D20	18.5	24.3	1.2
D25	23.2	29.8	1.2
D30	27.9	35.3	1.5

M SUJ2
H 58HRC～
(D30 Induction harding)
A C ring (S45C)

A center hole may remain on one or both ends.

D		D1	K	t	S	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
10	−0.015 −0.020	13.3	0.2	1.2	19	EGHR	10	60～ 70	Quotation
								75～100	
								105～120	
13	−0.020 −0.025	16.6	0.3				13	70	
								75～100	
								105～125	
								130～150	
								155～170	
16		19.7	0.4				16	70	
								75～100	
								105～125	
								130～150	
								155～170	

D		D1	K	t	S	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
20	−0.025 −0.030	24.3	0.5	1.4	19	EGHR	20	70	Quotation
								75～ 90	
								95～110	
								115～130	
								135～150	
								155～170	
								175～200	
25		29.8	0.55				25	70	
								75～ 90	
								95～110	
								115～130	
								135～150	
								155～170	
								175～200	
30		35.3	0.7	1.7	29		30	160～170	
								175～200	
								205～230	

Order

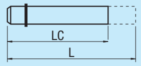
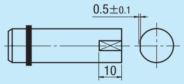
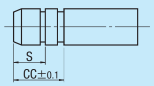
Part Number	—	L
EGHR25	—	75

Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L (LC)	—	(AVC・CC)		
EGHR16	—	LC 110.5	—	AVC	—	CC24

Alterations	Code	Spec.	1Code
	LC	Changes the full length. LC=0.1mm increments Lmin.<LC<Lmax.	Quotation
	AVC	Air vent machining All D dimensions ···▸ Groove depth: 0.5±0.1 Groove width: 10±0.5	
	CC	Adds another C ring groove. Select from CC19・24・29・34・39 Available when L≧70 C-ring groove at the original position of S off the pin end still remains after CC alteration for the alternative.	

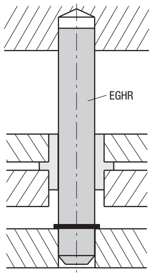
Example

■Characteristics

- For ejector leader pins (C ring type), ejector leader pin can be easily installed and removed.

Notes Use EGHR after inlaying the mold plate. Please note that C ring might break if the mold plate is striken.

Pin: C ring type
Bushing: Plain type
P.968



EJECTOR LEADER PINS

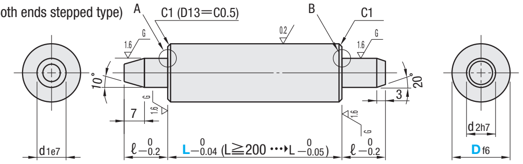
—STEPPED TYPE—

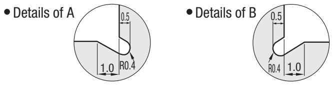
Non JIS material definition is listed on P.1351 - 1352

Induction hardening on L dimension part, both ends are not quenched.

RoHS

EGPD (Both ends stepped type)
(D13～50)

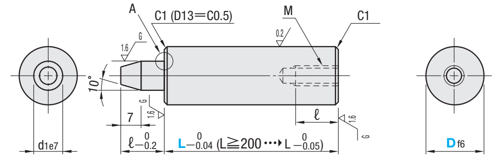


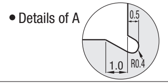


M SUJ2
H L dimension part
58HRC～ (Induction hardening)

RoHS

EGPP (Stepped end+tapped end type)
(D13～40)





D	M×Pitch
13・16	M 6×1.0
20・25	M 8×1.25
30・35・40	M10×1.5

M SUJ2
H L dimension part
58HRC～ (Induction hardening)

Df6		d1e7		d2h7		ℓ	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
13	−0.016 −0.027	8	−0.025 −0.040	8	0 −0.015	12	EGPD (D13～50) EGPP (D13～40)	13	40～ 95	Quotation
									100～125	
									130～150	
16		10		10		15		16	50～ 95	
									100～125	
									130～150	
20	−0.020 −0.033							20	50～ 95	
									100～125	
									130～150	
25								25	50～ 95	
									100～125	
									130～150	
30		20	−0.040 −0.061	20	0 −0.021	20		30	50～125	
									130～155	
									160～200	
									205～230	
									235～260	
									265～300	

Df6		d1e7		d2h7		ℓ	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
35	−0.025 −0.041	20	−0.040 −0.061	20	0 −0.021	20	EGPD (D13～50) EGPP (D13～40)	35	50～125	Quotation
									130～155	
									160～200	
									205～230	
									235～260	
									265～300	
40								40	90～125	
									130～155	
									160～200	
									205～230	
									235～260	
									265～300	
50								(50)	90～125	
									130～155	
									160～200	
									205～230	
									235～260	
									265～300	

D (50) available only for EGPD

Order

Part Number	—	L
EGPD20	—	90

Days to Ship Quotation

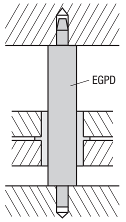
Price Quotation

Alterations

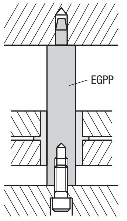
Part Number	—	L	—	(MC)
EGPD30	—	150	—	MC

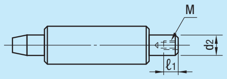
Example

Pin: Both ends stepped type
Bushing: Plain type
P.968



Pin: Stepped end+tapped end type
Bushing: Plain type
P.968



Alteration	Code	Spec.	1Code
	MC	Tapped for pulling out ⊗ Not available for EGPP	Quotation

D	d2	M	ℓ1
13	8	M 4	8
16・20・25	10	M 6	12
30・35・40・50	20	M10	15

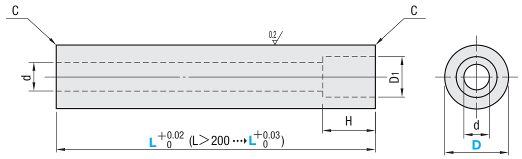
PRECISION EJECTOR LEADER PINS

—BOLT FIXING COUNTERBORE TYPE—

RoHS

EGZA

D	C
16～30	0.5
35・40	1.0



All pieces are ground together when 8 pieces or less are ordered.
(Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range.)

M SUJ2
H 58HRC～
(Induction hardening)

Applicable bolt size (M)	D		d	D1	H	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
M6	16	−0.020 −0.025	7	11	7	EGZA	16	50～ 70	Quotation
								75～ 90	
M8	20	−0.025 −0.030	9	14	9		20	50～ 70	
								75～ 90	
								95～110	
								115～130	
	25						25	50～ 70	
								75～ 90	
								95～110	
								115～130	
M10	30		11	18	13		30	50～ 70	
								75～ 90	
								95～110	
								115～130	
								135～150	
								155～170	
								175～190	

Applicable bolt size (M)	D		d	D1	H	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
M10	35	−0.025 −0.030	11	18	13	EGZA	35	50～ 70	Quotation
								75～ 90	
								95～110	
								115～130	
								135～150	
								155～170	
								175～190	
M12	40		14	20	15		40	50～ 70	
								75～ 90	
								95～110	
								115～130	
								135～150	
								155～170	
								175～200	
								205～225	
								230～250	

Order

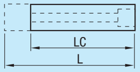
Part Number	—	L
EGZA30	—	50

Days to Ship Quotation

Price Quotation

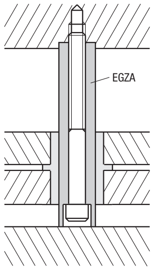
Alterations

Part Number	—	L (LC)
EGZA30	—	LC 128.5

Alteration	Code	Spec.	1Code
	LC	Changes the full length. LC=0.1mm increments 50<LC<Lmax.	Quotation

Example

Pin: counterbore type
Bushing: Plain type
P.968



PRECISION EJECTOR LEADER PINS

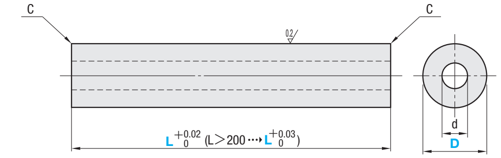
—THROUGH BOLT HOLE TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

EGHA

D	C
16～30	0.5
35・40	1.0



All pieces are ground together when 8 pieces or less are ordered.
(Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range.)

M SUJ2
H 58HRC～
(Induction hardening)

Applicable bolt size (M)	D		d	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
M6	16	−0.020 −0.025	7	EGHA	16	50～ 70	Quotation
						75～ 90	
M8	20	−0.025 −0.030	9		20	50～ 70	
						75～ 90	
						95～110	
						115～130	
	25				25	50～ 70	
						75～ 90	
						95～110	
						115～130	
M10	30		11		30	50～ 70	
						75～ 90	
						95～110	
						115～130	
						135～150	
						155～170	
						175～190	

Applicable bolt size (M)	D		d	Part Number Type	Part Number D	L 5mm increments	U/Price 1～9
M10	35	−0.025 −0.030	11	EGHA	35	50～ 70	Quotation
						75～ 90	
						95～110	
						115～130	
						135～150	
						155～170	
						175～190	
M12	40		14		40	50～ 70	
						75～ 90	
						95～110	
						115～130	
						135～150	
						155～170	
						175～200	
						205～225	
						230～250	

Order

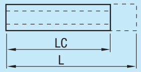
Part Number	—	L
EGHA30	—	50

Days to Ship Quotation

Price Quotation

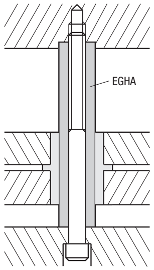
Alterations

Part Number	—	L (LC)
EGHA30	—	LC 128.5

Alteration	Code	Spec.	1Code
	LC	Changes the full length. LC=0.1mm increments 50<LC<Lmax.	Quotation

Example

Pin: Through bolt hole type
Bushing: Plain type
P.968



EJECTOR LEADER PINS FOR MIDDLE · LARGE MOLD

—STEPPED TYPE／BOLT HOLE TYPE—

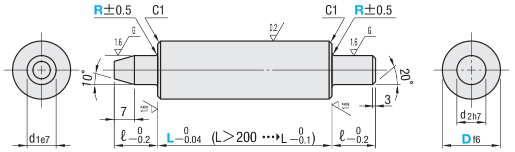
EJECTOR LEADER BUSHINGS

—PLAIN／LONG S DIMENSION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

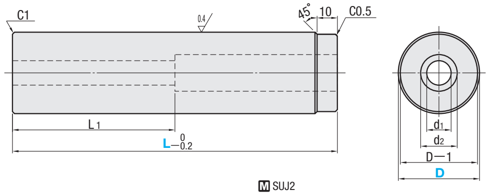
EGPDX (Df6)


R±0.5
C1
C1
R±0.5
1.6
G
0.2
1.6
G
10°
20°
7
1.6
3
1.6
d1e7
ℓ 0 −0.2
L 0 −0.04 (L>200 ⋯▸L 0 −0.1)
ℓ 0 −0.2
d2h7
Df6

M SUJ2
H L dimension part
58HRC～ (Induction hardening)

RoHS

EGPDHE (De7)
EGPDHF (Df6)


C1
0.4
45°
10
C0.5
L1
L 0 −0.2
d1
d2
D−1
D

M SUJ2
H 58HRC～ (Induction hardening)
A Mounting bolt (CB) 1Pc.

Df6		d1e7		d2h7		ℓ	Part Number		L	R	U/Price
							Type	D	5mm increments	Selection	1～9
30	−0.020 −0.033	20	−0.040 −0.061	20	0 −0.021	20	EGPDX	30	150～200		Quotation
									205～250		
									255～300		
40	−0.025 −0.041	30		30		30		40	150～200	1 2	
									205～250		
									255～300		
									305～350		
									355～400		
50								50	150～200	1 2 3	
									205～250		
									255～300		
									305～350		
									355～400		

D	D tolerance		d1	d2	L1	A	Part Number		L
	EGPDHE (De7)	EGPDHF (Df6)					Type	D	5mm increments
25	−0.040 −0.061	−0.020 −0.033	9	14	75	CB 8− 90	EGPDHE (De7) EGPDHF (Df6)	25	150～200
					105	CB 8−120			205～250
					135	CB 8−150			255～300
35	−0.050 −0.075	−0.025 −0.041	11	18	80	CB10−100		35	150～200
					110	CB10−130			205～250
					140	CB10−160			255～300
40			11	18	80	CB10−100		40	150～200
					110	CB10−130			205～250
					140	CB10−160			255～300
50			14	20	80	CB12−100		50	150～200
					110	CB12−130			205～250
					140	CB12−160			255～300
					180	CB12−200			305～350

Order

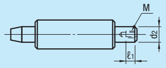
Part Number — L — R
EGPDX30 — 155 — 2

Price Quotation

Days to Ship Quotation

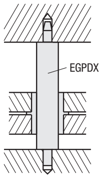
Alterations

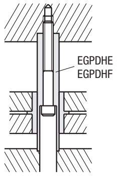
Part Number — L — R — (MC)
EGPDX30 — 150 — 2 — MC

Alteration	Code	Spec.	1Code
	MC	Adds a tap for extracting. d2 M ℓ1 20 M10 15 30 M12 18 Available for EGPDX	Quotation

Example

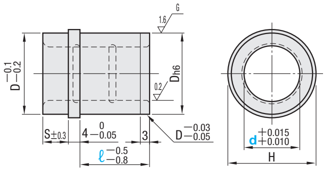
Pin : Two sides stepped type
Bushing : Plain type
(Right page)




EGPDHE
EGPDHF

RoHS

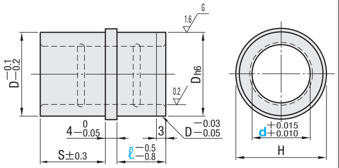
EGBH (Plain type)


1.6
G
0.2
D −0.1 −0.2
Dh6
S±0.3
4 0 −0.05
3
ℓ −0.5 −0.8
D −0.03 −0.05
d +0.015 +0.010
H

M SUJ2
H 58HRC～

RoHS

EGBN (Long S dimension type)


1.6
G
0.2
D −0.1 −0.2
Dh6
4 0 −0.05
3
D −0.03 −0.05
d +0.015 +0.010
S±0.3
ℓ −0.5 −0.8
H

M SUJ2
H 58HRC～

S	H	Dh6		Part Number		ℓ	U/Price
				Type	d		1～9
8	19	16	0 −0.011	EGBH	8	10 13	Quotation
						15	
8	21	18			10	10 13	
						15 20	
10	23	20	0 −0.013		12	10 13	
10	25	22			13	10 13 15	
						20 25	
10	28	25			16	10 13 15	
						20 25	
10	33	30			20	10 13 15	
						20 25 30	
10	38	35	0 −0.016		25	13 15	
						20 25 30	
15	43	40			30	13 15 20 25 30	
15	45	42			32	15 20 25 30	
20	48	45			35	20 25 30	
20	55	52	0 −0.019		40	20 25 30	
20	65	62			50	25 30	

S	H	Dh6		Part Number		ℓ	U/Price
				Type	d		1～9
ℓ+8	25	22	0 −0.013	EGBN	13	10	Quotation
						15 20	
	28	25			16	10	
						15 20	
	33	30			20	10 15	
						20 25	
	38	35	0 −0.016		25	10	
						15 20 25	
	43	40			30	20 25 30	
	48	45			35	20 25 30	
	55	52	0 −0.019		40	20 25 30	
	65	62			50	20 25 30	

Order

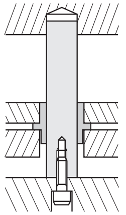
Part Number	—	ℓ
EGBH8	—	10
EGBN13	—	10

Price Quotation

Days to Ship Quotation

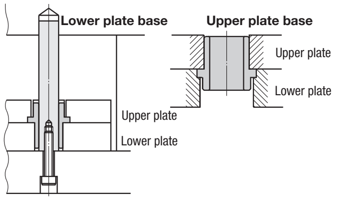
Example

Example of EGBH Usage



Example of EGBN Usage

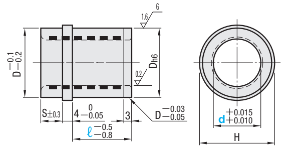
- To use in commercial mold base, there are two ways-whether to make the counterbore on the upper or lower plate. In contrast to the short guide type EGBH ejector leader bushings, EGBN and EGBNZ/EGBZ/EGBSK (P.970) provide a longer leading distance regardless of which plate the counterbore is based.


Lower plate base
Upper plate base
Upper plate
Lower plate
Upper plate
Lower plate

OIL-FREE EJECTOR LEADER BUSHINGS

RoHS

EGBHZ (Long S dimension・oil-free type)



●Usable temperature range for the special solid lubricant: 80˚C or less＊

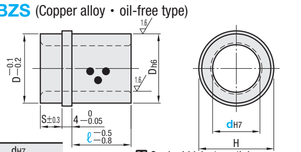
M SUJ2
Special solid lubricant
MoS2 (Embedded)

H 58HRC～

S	H	Dh6		Part Number Type	d	ℓ	U/Price 1～9
10	25	22	0 −0.013	EGBHZ	13	10 13 15	Quotation
10	28	25			16	13 15	
						20	
10	33	30			20	13 15	
						20	
10	38	35	0 −0.016		25	15	
						20 25	
15	43	40			30	15 20 25	
20	48	45			35	20 25	
20	55	52	0 −0.019		40	20 25 30	
20	65	62			50	25 30	

RoHS

EGBZS (Copper alloy・oil-free type)



dH7	
13・16	$^{+0.018}_{0}$
20～30	$^{+0.021}_{0}$
35～50	$^{+0.025}_{0}$

M Grade-4 high strength brass
(CAC304)
(OldJIS・HBsC4)
Special solid lubricant (Embedded)

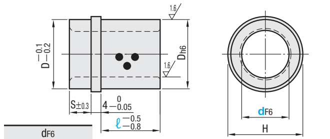
●Usable temperature range for the special solid lubricant: 150˚C or less＊

S	H	Dh6		Part Number Type	d	ℓ	U/Price 1～9
10	25	22	0 −0.013	EGBZS	13	10 13 15	Quotation
10	28	25			16	13 15	
						20	
10	33	30			20	13 15	
						20	
10	38	35	0 −0.016		25	15	
						20 25	
15	43	40			30	15 20 25	
20	48	45			35	20 25	
20	55	52	0 −0.019		40	20 25 30	
20	65	62			50	25 30	

●EGBZS (Oil-free type)･･･
Special solid lubricant embedded eliminates the need for lubrication. (Applying initial running-in oil prior to use can enhance the product's durability furthermore.)
Please note that oil oozes out from the solid lubricant at about 80˚C.

RoHS

EGBPK (High temperature use・Copper alloy・oil-free type)



dF6	
13・16	$^{+0.027}_{+0.016}$
20～30	$^{+0.033}_{+0.020}$
35～50	$^{+0.041}_{+0.025}$

M Special high strength copper (CAC304)
Special solid lubricant Graphite (embedded)

●Usable temperature range for the special solid lubricant: 250˚C or less＊

S	H	Dh6		Part Number Type	d	ℓ	U/Price 1～9
10	25	22	0 −0.013	EGBPK	13	13 15	Quotation
10	28	25			16	15	
10	33	30			20	13 15	
						20	
10	38	35	0 −0.016		25	15	
						20	
15	43	40			30	20 25	
20	48	45			35	25	
20	55	52	0 −0.019		40	25 30	
20	65	62			50	30	

●For features of EGBPK (high temperature use/copper alloy type), refer to P.921

Order

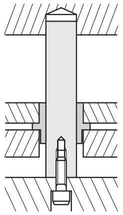
Part Number	— ℓ	— L
EGBHZ16	— 20	
EGBZS16	— 20	
EGBPK16	— 15	
EGBNZ16	— 20	
EGBZ20		— 33
EGBSK20		— 33

Price Quotation

Days to Ship Quotation

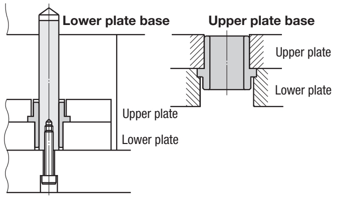
Example

Example of EGBHZ・EGBZS・EGBPK usage



Example of EGBNZ・EGBZ・EGBSK usage

- To use in commercial mold base, there are two ways-whether to make the counterbore on the upper or lower plate. In contrast to the short guide type EGBH (P.968) ejector leader bushings, EGBN (P.968) and EGBNZ/EGBZ/EGBSK provide a longer leading distance regardless of which plate the counterbore is based.



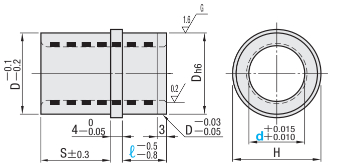
OIL-FREE EJECTOR LEADER BUSHINGS

—LONG S DIMENSION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

EGBNZ (Long S dimension・oil-free type)



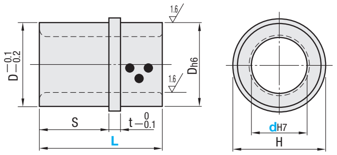
●Usable temperature range for the special solid lubricant: 80˚C or less＊

M SUJ2
Special solid lubricant
MoS2 (Embedded)
H 58HRC～

S	H	Dh6		Part Number Type	d	ℓ	U/Price 1～9
ℓ+8	28	25	0 −0.013	EGBNZ	16	10	Quotation
						15 20	
	33	30			20	10 15	
						20 25	
	38	35	0 −0.016		25	10	
						15 20 25	
	43	40			30	20 25 30	
	48	45			35	20 25 30	
	55	52	0 −0.019		40	20 25 30	
	65	62			50	20 25 30	

RoHS

EGBZ (Long S dimension・Copper alloy・oil-free type)



dH7	
13・16	$^{+0.018}_{0}$
20～30	$^{+0.021}_{0}$
35～50	$^{+0.025}_{0}$

D tolerance has been changed to $^{-0.1}_{-0.2}$.

M Grade-4 high strength brass
(CAC304)
(OldJIS・HBsC4)
Special solid lubricant (Embedded)

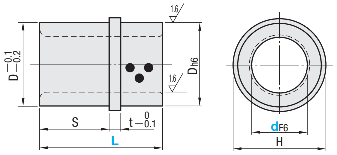
●Usable temperature range for the special solid lubricant: 150˚C or less＊

S	H	Dh6		t	Part Number Type	d	L Selection	U/Price 1～9
14	25	22	0 −0.013	4	EGBZ	13	25	Quotation
	28	25				16	25	
19							33	
14	33	30				20	25	
19							33	
							38	
24							43	
14	38	35	0 −0.016			25	25	
19							33	
							38	
24							43 53	
19	43	40				30	33	
24							38	
							43	
29							53	
24	48	45				35	38	
							43	
29							53	
39							68	
24	61	55	0 −0.019	8		40	43	
29							53	
39							68	
29	71	65				50	53	
39							68	

● EGBZ (Oil-free type)･･･
Special solid lubricant embedded eliminates the need for lubrication. (Applying initial running-in oil prior to use can enhance the product's durability furthermore.)
Please note that oil oozes out from the solid lubricant at about 80˚C.

RoHS

EGBSK (High temperature use/Long S dimension/Copper alloy・oil-free type)



dF6	
20～30	$^{+0.033}_{+0.020}$
35～50	$^{+0.041}_{+0.025}$

M Special high strength copper (CAC304)
Special solid lubricant Graphite (embedded)

●Usable temperature range for the special solid lubricant: 250˚C or less＊

S	H	Dh6		t	Part Number Type	d	L Selection	U/Price 1～9
19	33	30	0 −0.013	4	EGBSK	20	33	Quotation
							38	
19	38	35	0 −0.016			25	38	
24							43	
24	43	40				30	43	
29							53	
29	48	45				35	53	
39							68	
29	61	55	0 −0.019	8		40	53	
39							68	
39	71	65				50	68	

● For features of EGBSK (high temperature use/copper alloy type), refer to P.922

■Order・Delivery・Quantity discount・Example ☞ Left page

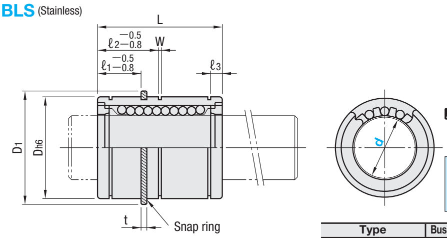
EJECTOR LEADER BUSHINGS

—LINEAR GUIDE TYPE・STEEL/STEEL (SHORT TYPE)/STAINLESS—

Non JIS material definition is listed on P.1351 - 1352

RoHS

EGBL (Steel)
EGBLT (Steel —Short type—)
EGBLS (Stainless)



This product is delivered with a snap ring set in the ℓ1 groove.

Type		Bushing body, balls	Ball retainer
EGBL EGBLT	M	SUJ2 equivalent	Steel
	H	58HRC～	—
EGBLS	M	SUS440C or equivalent	
	H	58HRC～	

d		Dh6		D1	L		ℓ1	ℓ2	ℓ3	t	W	Dynamic load N (kgf)	Part Number		U/Price for 1～9	
													Type	d	EGBL EGBLT	EGBLS
6	0 −0.009	12	0 −0.011	15.5	19	0 −0.2	9	—	2.75	1.0	1.1	206 (21)	EGBL EGBLS	6	Quotation	
8		15		19.3	24		10	—	3.25			265 (27)		8		
10		19	0 −0.013	23.6	29		13	—	3.5	1.2	1.3	373 (38)		10		
13		23		28.5	32		13	—	4.5			510 (52)		13		
16		28		34.2	37		15	20	5.25	1.5	1.6	775 (79)		16		
20	0 −0.010	32	0 −0.016	38.4	42		20	25	5.75			863 (88)		20		
25		40		47.1	59	0 −0.3	20	25	9	1.75	1.85	981 (100)		25		
30		45		52.8	64		25	30	9.75			1,569 (160)		30		
25	0 −0.010	40	0 −0.016	47.1	44	0 −0.3	20	25	6.25	1.75	1.85	764 (78)	EGBLT (Short type)	25		
30		45		52.8	54		25	30	7.75			1,442 (147)		30		

Load (kgf)＝Load N×0.101972

Order	Part Number
	EGBL10 EGBLT25

Price: Quotation

Days to Ship: Quotation

■Features

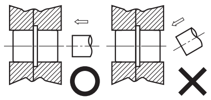
- A linear guide type bushing developed for use with ejector plate leaders.
- Relocating the snap ring set in the ℓ1 groove upon delivery to the ℓ2 position allows it to be used with ejector plates of a different thickness.
- Can be used with a spacer (EGBS) that is specially designed for use with this bushing.
- Is easy to mount.
- Imposes no stroke limit.

■Notes

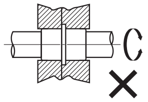
- Please use precision pins (**EGH・EGHC・EGHN・EGZA・EGHA ☞ P.961・962・965・966**).
- Use this product (EGBL, EGBLT) under a temperature 80°C or lower. Use this product (EGBLS) under a temperature 120°C or less.

■Notes on handling ejector leader bushing

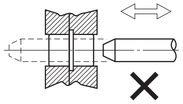
① When inserting the leader pin into linear guide type, if the leader pin is inserted not straight the ball may come off and the retainer may deform. Please install it gently and straight matching the core.



② Do not use a linear type for rotary motion.



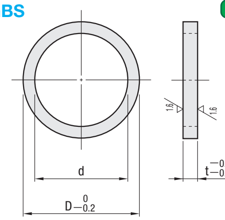
③ Do not use a linear type for applications involving repeated removal and insertion.



■Spacers for Linear Type Ejector Leader Bushing

EGBS

RoHS



M S45C

Leader bushing d	D	d	t	Part Number		U/Price			
				Type	No.	1～9	10～49	50～99	100～200
6	16	12	3	EGBS	6	Quotation			
8	19	15	3		8				
10	23	19	2.8		10				
13	28	23			13				
16	34	28	2.5		16				
20	38	32			20				
25	46	40	2.25		25				
30	51	45			30				

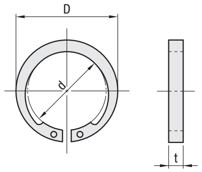
Order	Part Number
	EGBS10

Days to Ship: Quotation

■Snap Rings for Linear Type Ejector Leader Bushing

EGBW

RoHS



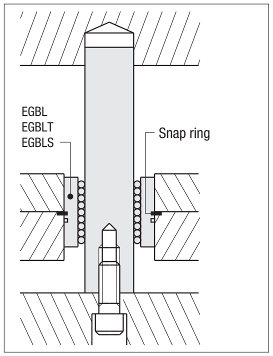
M SK4

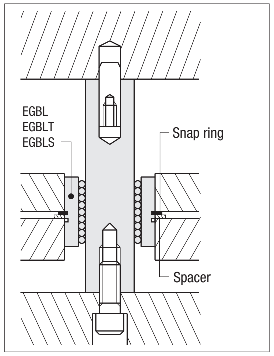
Leader bushing d	D	d	t	Part Number		U/Price			
				Type	No.	1～9	10～49	50～99	100～200
6	15.5	11.1	1.0	EGBW	6	Quotation			
8	18.6	13.8	1.0		8				
10	23.1	17.5	1.2		10				
13	27.7	21.5			13				
16	33.1	25.9	1.5		16				
20	37.4	29.6			20				
25	46.2	37.0	1.75		25				
30	51.3	41.5			30				

Order	Part Number
	EGBW10

Days to Ship: Quotation

Example





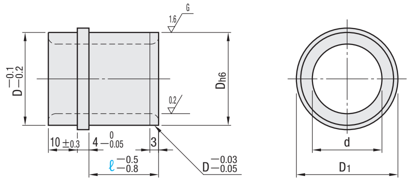
EJECTOR LEADER BUSHINGS

—BALL TYPE—

BALL RETAINERS

Non JIS material definition is listed on P.1351 - 1352

RoHS **EGBB**



M SUJ2
H 58HRC∼

D1	Dh6		d		Part Number Type	No.	ℓ	U/Price 1∼9
19	16	0 −0.011	12	−0.025 −0.030	EGBB	8	13 15	Quotation
21	18		14			10	13 15	
25	22	0 −0.013	17	−0.030 −0.035		13	13 15	
							20 25	
28	25		20			16	13 15	
							20 25	
33	30		24	−0.035 −0.040		20	13 15	
							20 25	
38	35	0 −0.016	29			25	13 15	
							20 25	
43	40		34			30	13 15	
							20 25	

Order	Part Number	—	ℓ
	EGBB16	—	20

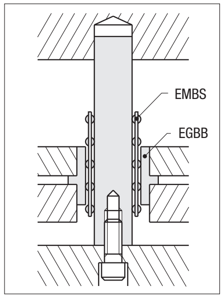
Price **Quotation**

Days to Ship **Quotation**

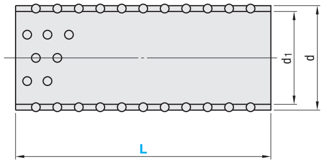
■**Notes**

- Please use precision pins (**EGH・EGHC・EGHN・EGZA・EGHA** **P.961・962・965・966**)
- It also provides a higher dynamic load rating than the linear guide type bushings.

Example



RoHS **EMBS**



M Ball retainer C3604
Ball SUJ2
A O-ring

Ball Dia.	d1	d	Part Number Type	No.	L	U/Price 1∼9
2	8.5	11.5	EMBS	8	25 30	Quotation
					35	
	10.5	13.5		10	25 30	
					35 40	
	13.5	16.5		13	35 40	
					45 50	
					55 60	
					70	
	16.5	19.5		16	35 40	
					45 50	
					55 60	
					65 70	
	20.5	23.5		20	35 40	
					45 50	
					55 60	
					65 70	
	25.5	28.5		25	35 40	
					45 50	
					55 60	
					65 70	
	30.5	33.5		30	35 40	
					45 50	
					55 60	
					65 70	

For details of ball retainer length selection, **P.975**
An accessory O-ring fixes the ball retainer's position. Please use it when you install the ball retainer in the mold.
Installation method **P.1137**

Order	Part Number	—	L
	EMBS20	—	45

Price **Quotation**

Days to Ship **Quotation**

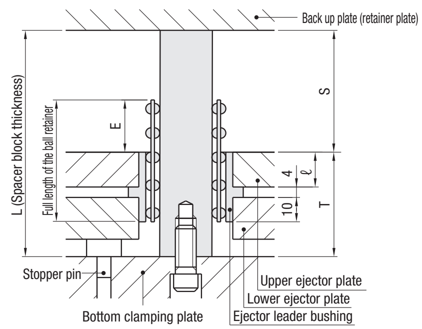
■**Notes**

- The ball (SUJ2) of the ball retainer undergoes thermal expansion, so use it at a temperature of no more than 100°C as a rough guide.

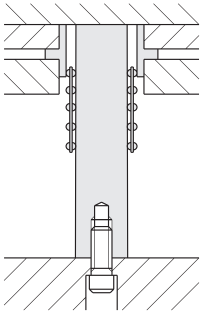
HOW TO DETERMINE THE BALL RETAINER LENGTH

■Movement of Ball Retainer

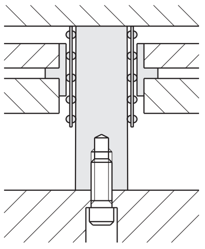
Ⅰ. State of the mold closed which the ejector plate returned completely.



Ⅱ. The ball retainer may come off if the difference between S and E is too large.



Ⅲ. The ball retainer may hit the backup plate (retainer plate) when the difference between S and E is too small.



The ball retainer's travel distance is a half of the bushing's. To ensure the ball retainer's correct stroking movement and avoid problems shown in Fig. Ⅱ and Ⅲ above, its length must be carefully selected.

■Table Ⅰ: Ball Retainer Length Selection

※T dimension is calculated in 4 ways as follows

① Using a stopper pin or stopper ring (thickness: $5^{m}/_{m}$)………T=Thickness of the ejector plate (upper & lower)$+5^{m}/_{m}$
② Using a spacer (thickness: $4^{m}/_{m}$)……………………………T=Thickness of the ejector plate (upper & lower)$+4^{m}/_{m}$
③ Combination of ① and ② (as in Fig Ⅰ)……………………T=Thickness of the ejector plate (upper & lower)$+9^{m}/_{m}$
④ Ejector plate only (neither ① nor ②)………………………T=Thickness of the ejector plate (upper & lower)

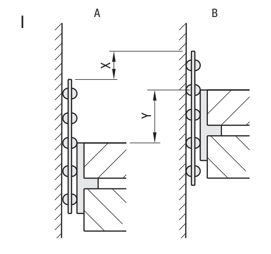
Method of mounting		① Using a stopper pin or stopper ring					② Using a spacer					③ · Using a stopper pin or stopper ring · Using a spacer					④ Ejector plate only				
T	Upper ejector plate thickness	13	15	15	20	25	13	15	15	20	25	13	15	15	20	25	13	15	15	20	25
	Lower ejector plate thickness	15	15	20	25	30	15	15	20	25	30	15	15	20	25	30	15	15	20	25	30
Spacer block thickness	50	35	35	35 (8)	—	—	35	35	35 (10)	—	—	35 (10)	35 (10)	—	—	—	35	35	35	35	—
	60	40	40	35	35	—	40	40	35	35	—	35	35	35	35	—	40	40	40	40	40
	70	45	45	40	40	40	45	45	40	40	40	40	40	40	40	40	45	45	45	45	45
	80	50	50	45	45	45	50	50	45	45	45	45	45	45	45	45	50	50	50	50	50
	90	55	55	50	50	50	55	55	50	50	50	50	50	50	50	50	55	55	55	55	55
	100	60	60	55	55	55	60	60	55	55	55	55	55	55	55	55	60	60	60	60	60
	110	65	65	60	60	60	65	65	60	60	60	60	60	60	60	60	65	65	65	65	65
	120	70	70	65	65	65	70	70	65	65	65	65	65	65	65	65	70	70	70	70	70

※ Values in ( ) signify the maximum strokes. These combinations make the ball retainer hit the backup plate (retainer plate) before the ejector plate as in the case of Fig. Ⅲ above. These values in ( ) also signify the ejector plate's stroke when the ball retainer hits the backup plate (retainer plate).
※ Values not enclosed in ( ) signify combinations that allow the ejector plate to stroke until it hits the backup plate (retainer plate).

HOW TO MOUNT THE BALL RETAINER

Non JIS material definition is listed on P.1351 - 1352

■Ball Retainer Motion

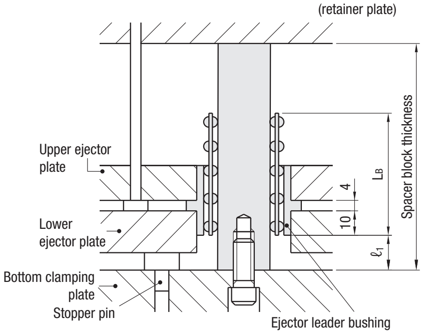


X: Travel of the ball retainer
Y: Travel of the bushing (ejector plate)
※$X=\frac{1}{2}Y$ (relative travelling distance)

Fig. Ⅰ shows travel distances of the ball retainer and bushing (ejector plate) when the ejector plate strokes from A to B. The ball retainer travels a half of the bushing's travel distance.
Upon insertion of the ball retainer, preload applies between the pin and bushing.
Rolling motion of the retainer's built-in balls reduce friction and eliminate possibilities of galling, enabling the ejector plate to stroke smoothly.

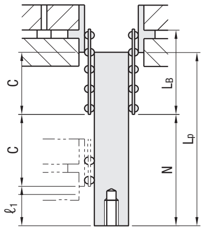
■How to Mount

Ⅱ



Ⅲ

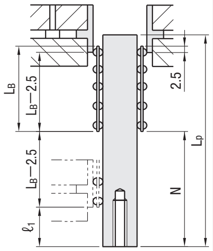
When $L_p<2L_B+\ell_1-5$:
The ball retainer protrudes from the pin when set.



$N=\frac{L_p+\ell_1}{2}-5$

Ⅳ

When $L_p\geqq 2L_B+\ell_1-5$:
The ball retainer is in the pin.



$N=L_B+\ell_1-5$

Mounting the ball retainer so that the bushing's lower end aligns with the ball retainer's lower end when the ejector plate is fully returned (the mold is closed) as shown in Fig. Ⅱ above. To achieve this, attach the ball retainer to the pin before inserting it into the bushing, and fix it at the N position shown in Fig. Ⅲ and Ⅳ using an O-ring. Then insert it into the bushing. Sliding the pin and bushing by the length of their engagement (C in Fig. Ⅲ and LB-2.5 in Fig. Ⅳ) should make the lower ends of the both meet, leaving the specified ℓ_1 length.

●To obtain N, calculation of ℓ_1 is necessary.

1. ℓ_1 calculation
   - ① Using a stopper pin or stopper ring…………………ℓ_1=Thickness of the plate (upper & lower)+5−Full length of the bushing
   - ② Using a spacer……………………………ℓ_1=Thickness of the plate (upper & lower)+4−Full length of the bushing
   - ③ Combination of ① and ②………………ℓ_1=Thickness of the plate (upper & lower)+9−Full length of the bushing
   - ④ Ejector plate only (neither ① nor ②)……………………ℓ_1=Thickness of the plate (upper & lower)−Full length of the bushing
2. N calculation
   - When $L_p<2L_B+\ell_1-5$, ……$N=\frac{L_p+\ell_1}{2}-5$ (Fig. Ⅲ)
   - When $L_p\geqq 2L_B+\ell_1-5$, ……$N=L_p+\ell_1-5$ (Fig. Ⅳ)

※L_p: Full length of the ejector leader pin (L_p=Actual measured length of the pin for inlay style application)
L_B: Full length of the ball retainer

RETURN PINS

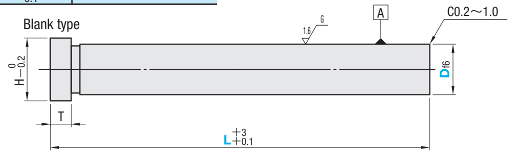
—BLANK TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type	head (T)	T T	Squareness of the head
RP4TH	4mm	0 −0.05	A 0.1 ⊥
RP8TH	8mm	0 −0.1	
RP4TJ	4mm	0 −0.05	A 0.05 ⊥
RP8TJ	8mm	0 −0.1	

Blank type



A center hole may remain on one or both ends.

M SUJ2
H 58HRC〜
Induction hardening

H	Df6		Part Number		L
			Type	D	50mm increments
11	8	−0.013 −0.022	4mm head **RP4TH** (Squareness of the head :0.1) **RP4TJ** (Squareness of the head: 0.05)	8	150〜250
15	10			10	150〜300
17	12	−0.016 −0.027		12	150〜300
18	13			13	150〜300
20	15			15	150〜350
21	16			16	150〜350
25	20	−0.020 −0.033		20	150〜400
30	25			25	150〜450
35	30			30	150〜450
37	32	−0.025 −0.041		32	150〜450
15	10	−0.013 −0.022	8mm head **RP8TH** (Squareness of the head: 0.1) **RP8TJ** (Squareness of the head: 0.05)	10	150〜300
17	12	−0.016 −0.027		12	150〜300
18	13			13	150〜300
20	15			15	150〜350
21	16			16	150〜350
25	20	−0.020 −0.033		20	150〜600 (450)*
30	25			25	150〜600 (450)*
35	30			30	150〜650 (450)*
37	32	−0.025 −0.041		32	150〜650 (450)*
40	35		**RP8TH** (Squareness of the head: 0.1)	35	300〜700
45	40			40	300〜700
55	50			50	300〜700

(450)*: RP8TJ, When D20〜32, L=150〜450.

Order

Part Number	—	L
RP4TH20	—	300

Days to Ship **Quotation**

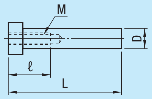
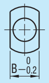
■Types and Diameters of Applicable Coil Springs (Details P.1235〜1248・1251〜1256)

Return pins	Coil springs for return pin					Coil springs		
D	SWY	SWU	SWR	SWS	SWN	SWF	SWL	SWM
8	ϕ12.5	ϕ14.5	ϕ14.5	ϕ14.5	ϕ14.5	ϕ18	ϕ18	—
10	ϕ16.5	ϕ17	ϕ17	ϕ17	ϕ17	ϕ20・ϕ22	ϕ22	ϕ22
12	ϕ20.5	ϕ21	ϕ21	ϕ21	ϕ21	ϕ25・ϕ27	ϕ27・ϕ30	ϕ27・ϕ30
13								
15	ϕ24.5	ϕ26	ϕ26	ϕ26	ϕ26	ϕ30・ϕ35	ϕ35	ϕ35
16								
20	ϕ30	ϕ31	ϕ31	ϕ31	ϕ31	ϕ40	ϕ40	ϕ40
25	ϕ37	ϕ37	ϕ37	ϕ37	ϕ37	ϕ50	ϕ50	ϕ50
30	ϕ42	ϕ43	ϕ43	ϕ44.5	—	ϕ60	—	—
32	—	—	ϕ46	ϕ46				
35			ϕ50	ϕ52		ϕ70	ϕ70	ϕ70

Price **Quotation**

Alterations

Part Number	—	L	—	(MMC・SC)
RP4TH20	—	300	—	MMC8

Alterations	Code	Spec.	1Code
	MMC	Adds a tap on the head. ℓ=M×2 D 8: Tap M selection 4 D 10, 12: 4・5 D 13, 15: 5・6 D 16, 20: 6・8 D 25, 30, 32: 8・10 D 35, 40, 50: 8・10・12	Quotation
	SC	Adds two parallel flats on the head as shown in the figure (Spanner groove width alteration). ϕD: 8, 10, 12, 13, 15, 16, 20, 25, 30, 32, 35, 40, 50 B: 8, 10, 13, 13, 17, 17, 22, 27, 32, 32, 35, 40, 50	

RETURN PINS

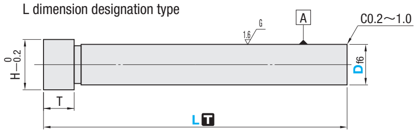
—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

Type	head (T)	T T	T L	Squareness of the head
RP4TL	4mm	$^{0}_{-0.05}$	$^{+0.5}_{+0.1}$	⊥ 0.1 A
RP8TL	8mm	$^{0}_{-0.1}$		
RP10TL	10mm	$^{0}_{-0.1}$		
RP4TV	4mm	$^{0}_{-0.05}$	L≦200 ···› $^{+0.2}_{+0.1}$ L＞200 ···› $^{+0.3}_{+0.1}$	⊥ 0.05 A
RP8TV	8mm	$^{0}_{-0.1}$		
RP4TZ	4mm	$^{0}_{-0.05}$	L≦200 ···› $^{+0.02}_{0}$ L＞200 ···› $^{+0.05}_{0}$	⊥ 0.02 A
RP8TZ	8mm	$^{0}_{-0.1}$		

L dimension designation type



M SUJ2
H 58HRC∼
Induction hardening

A center hole may be left on one or both ends.

H	Df6		Part Number Type	D	L 0.1mm increments
11	8	−0.013 −0.022	4mm head **RP4TL** (Squareness of the head: 0.1) **RP4TV** (Squareness of the head: 0.05)	8	35.0∼250.0
15	10			10	35.0∼300.0
17	12	−0.016 −0.027		12	35.0∼300.0
18	13			13	35.0∼300.0
20	15			15	35.0∼350.0
21	16			16	35.0∼350.0
25	20	−0.020 −0.033		20	50.0∼400.0
30	25			25	50.0∼450.0
35	30			30	50.0∼450.0
37	32	−0.025 −0.041		32	50.0∼450.0
15	10	−0.013 −0.022	8mm head **RP8TL** (Squareness of the head: 0.1) **RP8TV** (Squareness of the head: 0.05)	10	35.0∼300.0
17	12	−0.016 −0.027		12	35.0∼300.0
18	13			13	35.0∼300.0
20	15			15	35.0∼350.0
21	16			16	35.0∼350.0
25	20	−0.020 −0.033		20	50.0∼600.0 (400.0)*
30	25			25	50.0∼600.0 (450.0)*
35	30			30	50.0∼650.0 (450.0)*
37	32	−0.025 −0.041		32	50.0∼650.0 (450.0)*
40	35		**RP8TL** (Squareness of the head: 0.1)	35	100.0∼700.0
45	40			40	100.0∼700.0
55	50			50	100.0∼700.0
25	20	−0.020 −0.033	10mm head **RP10TL** (Squareness of the head: 0.1)	20	50.0∼300.0
30	25			25	50.0∼400.0
37	32	−0.025 −0.041		32	50.0∼700.0

H	Df6		Part Number Type	D	L 0.01mm increments
11	8	−0.013 −0.022	4mm head **RP4TZ** (Squareness of the head: 0.02)	8	35.00∼250.00
15	10			10	35.00∼300.00
17	12	−0.016 −0.027		12	35.00∼300.00
18	13			13	35.00∼300.00
20	15			15	35.00∼350.00
21	16			16	35.00∼350.00
25	20	−0.020 −0.033		20	50.00∼400.00
30	25			25	50.00∼450.00
35	30			30	50.00∼450.00
37	32	−0.025 −0.041		32	50.00∼450.00
15	10	−0.013 −0.022	8mm head **RP8TZ** (Squareness of the head: 0.02)	10	35.00∼300.00
17	12	−0.016 −0.027		12	35.00∼300.00
18	13			13	35.00∼300.00
20	15			15	35.00∼350.00
21	16			16	35.00∼350.00
25	20	−0.020 −0.033		20	50.00∼400.00
30	25			25	50.00∼450.00
35	30			30	50.00∼450.00
37	32	−0.025 −0.041		32	50.00∼450.00

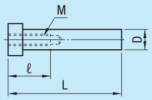
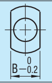
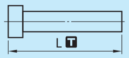
(400.0)*: RP8TV, When D20, L=50.0∼400.0.
(450.0)*: RP8TV, When D25∼32, L=50.0∼450.0.

Order Part Number — L
RP4TL 20 — 199.0

Days to Ship Quotation

Price Quotation

Alterations Part Number — L — (MMC · SC · LMC · SOF)
RP4TL 20 — 199.0 — MMC8

Alterations	Code	Spec.	1Code
	**MMC**	Adds a tap on the head. Tap M selection ℓ=M×2	Quotation
	**SC**	Adds two parallel flats on the head as shown in the figure (Spanner groove width alteration).	
	**LMC**	Changes the full length tolerance. Changes the full length tolerance to negative tolerance shown in the right table.	

D	Tap M selection	D	Tap M selection
8	4	25	8 • 10
10	4 • 5	30	
12		32	
13	5 • 6	35	8 • 10 • 12
15		40	
16	6 • 8	50	
20			

ϕD	8	10	12	13	15	16	20	25	30	32	35	40	50
B	8	10	13	13	17	17	22	27	32	32	35	40	50

	RP4TL RP8TL RP10TL	RP4TV RP8TV	RP4TZ RP8TZ
L≦200	$^{-0.1}_{-0.5}$	$^{-0.1}_{-0.2}$	$^{0}_{-0.02}$
L＞200		$^{-0.1}_{-0.3}$	$^{0}_{-0.05}$

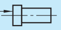
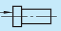
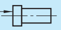
RETURN PINS

—L DIMENSION DESIGNATION WITH TAP HOLE TYPE—

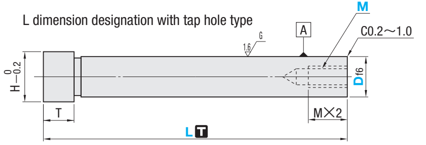
Non JIS material definition is listed on P.1351 - 1352

RoHS

L deimension designation with tap hole type

Type	head (T)	T T	T L	Squareness of the head
RP4TLM	4mm	$^{0}_{-0.05}$	$^{+0.5}_{+0.1}$	⊥ 0.1 A 
RP8TLM	8mm	$^{0}_{-0.1}$		
RP10TLM	10mm	$^{0}_{-0.1}$		
RP4TVM	4mm	$^{0}_{-0.05}$	L≦200 ⋯› $^{+0.2}_{+0.1}$ L＞200 ⋯› $^{+0.3}_{+0.1}$	⊥ 0.05 A 
RP8TVM	8mm	$^{0}_{-0.1}$		
RP4TZM	4mm	$^{0}_{-0.05}$	L≦200 ⋯› $^{+0.02}_{0}$ L＞200 ⋯› $^{+0.05}_{0}$	⊥ 0.02 A 
RP8TZM	8mm	$^{0}_{-0.1}$		

L dimension designation with tap hole type



A center hole may be left on one or both ends.

M SUJ2
H 58HRC～
Induction hardening

H	Df6		Part Number Type	D	L 0.1mm increments	M
11	8	−0.013 −0.022	4mm head **RP4TLM** (Squareness of the head: 0.1) **RP4TVM** (Squareness of the head: 0.05)	8	35.0～250.0	4
15	10			10	35.0～300.0	4・5
17	12	−0.016 −0.027		12	35.0～300.0	
18	13			13	35.0～300.0	5・6
20	15			15	35.0～350.0	
21	16			16	35.0～350.0	6・8
25	20	−0.020 −0.033		20	50.0～400.0	6・8・10・12
30	25			25	50.0～450.0	8・10・12・16
35	30			30	50.0～450.0	
37	32	−0.025 −0.041		32	50.0～450.0	
15	10	−0.013 −0.022	8mm head **RP8TLM** (Squareness of the head: 0.1) **RP8TVM** (Squareness of the head: 0.05)	10	35.0～300.0	4・5
17	12	−0.016 −0.027		12	35.0～300.0	
18	13			13	35.0～300.0	5・6
20	15			15	35.0～350.0	
21	16			16	35.0～350.0	6・8
25	20	−0.020 −0.033		20	50.0～(600.0)*	6・8・10・12
30	25			25	50.0～(650.0)*	8・10・12・16
35	30			30	50.0～(650.0)*	
37	32	−0.025 −0.041		32	50.0～(650.0)*	
40	35		**RP8TLM** (Squareness of the head: 0.1)	35	100.0～700.0	
45	40			40	100.0～700.0	
55	50			50	100.0～700.0	
25	20	−0.020 −0.033	10mm head **RP10TLM** (Squareness of the head: 0.1)	20	50.0～300.0	6・8・10・12
30	25			25	50.0～400.0	8・10・12・16
37	32	−0.025 −0.041		32	50.0～700.0	

H	Df6		Part Number Type	D	L 0.01mm increments	M
11	8	−0.013 −0.022	4mm head **RP4TZM** (Squareness of the head: 0.02)	8	35.00～250.00	4
15	10			10	35.00～300.00	4・5
17	12	−0.016 −0.027		12	35.00～300.00	
18	13			13	35.00～300.00	5・6
20	15			15	35.00～350.00	
21	16			16	35.00～350.00	6・8
25	20	−0.020 −0.033		20	50.00～400.00	6・8・10・12
30	25			25	50.00～450.00	8・10・12・16
35	30			30	50.00～450.00	
37	32	−0.025 −0.041		32	50.00～450.00	
15	10	−0.013 −0.022	8mm head **RP8TZM** (Squareness of the head: 0.02)	10	35.00～300.00	4・5
17	12	−0.016 −0.027		12	35.00～300.00	
18	13			13	35.00～300.00	5・6
20	15			15	35.00～350.00	
21	16			16	35.00～350.00	6・8
25	20	−0.020 −0.033		20	50.00～400.00	6・8・10・12
30	25			25	50.00～450.00	8・10・12・16
35	30			30	50.00～450.00	
37	32	−0.025 −0.041		32	50.00～450.00	

L dimension ( )* available for RP8TVM, When D20, L=50.0～400.0 and When D25～32, L=50.0～450.0.

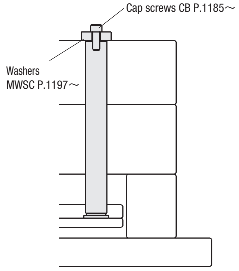
Order

Part Number	—	L	—	M
RP4TLM 20	—	199.0	—	M8

Days to Ship **Quotation**

Example

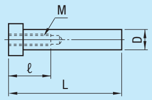
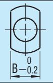
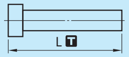
A return pin with a tap hole can be fixed with a bolt when assembling or performing maintenance on the die.



Price **Quotation**

Alterations

Part Number	—	L	—	M	—	(MMC・SC・LMC・SOF)
RP4TLM 30	—	200.0	—	M8	—	MMC8

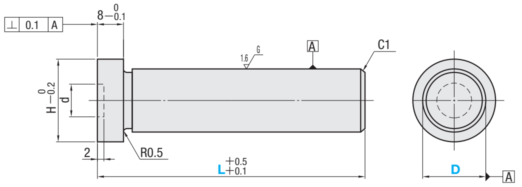
<table>
<tr><th>Alterations</th><th>Code</th><th>Spec.</th><th>1Code</th></tr>
<tr><td> </td><td>MMC</td><td>Adds a tap on the head.
Tap M selection
ℓ=M×2
<table>
<tr><th>D</th><th>Tap M selection</th><th>D</th><th>Tap M selection</th></tr>
<tr><td>8</td><td>4</td><td>25</td><td>8・10</td></tr>
<tr><td>10</td><td>4・5</td><td>30</td><td></td></tr>
<tr><td>12</td><td></td><td>32</td><td></td></tr>
<tr><td>13</td><td>5・6</td><td>35</td><td>8・10・12</td></tr>
<tr><td>15</td><td></td><td>40</td><td></td></tr>
<tr><td>16</td><td>6・8</td><td>50</td><td></td></tr>
<tr><td>20</td><td></td><td></td><td></td></tr>
</table></td><td rowspan="3">Quotation</td></tr>
<tr><td> </td><td>SC</td><td>Adds two parallel flats on the head as shown in the figure (Spanner groove width alteration).
<table>
<tr><th>φD</th><td>8</td><td>10</td><td>12</td><td>13</td><td>15</td><td>16</td><td>20</td><td>25</td><td>30</td><td>32</td><td>35</td><td>40</td><td>50</td></tr>
<tr><th>B</th><td>8</td><td>10</td><td>13</td><td>13</td><td>17</td><td>17</td><td>22</td><td>27</td><td>32</td><td>32</td><td>35</td><td>40</td><td>50</td></tr>
</table></td></tr>
<tr><td> </td><td>LMC</td><td>Changes the full length tolerance.
Changes the full length tolerance to negative tolerance shown in the right table.
<table>
<tr><th></th><th>RP4TLM
RP8TLM
RP10TLM</th><th>RP4TVM
RP8TVM</th><th>RP4TZM
RP8TZM</th></tr>
<tr><td>L≦200</td><td>$^{-0.1}_{-0.5}$</td><td>$^{-0.1}_{-0.2}$</td><td>$^{0}_{-0.02}$</td></tr>
<tr><td>L＞200</td><td></td><td>$^{-0.1}_{-0.3}$</td><td>$^{0}_{-0.05}$</td></tr>
</table></td></tr>
</table>

RETURN PINS FOR MIDDLE・LARGE MOLD

—COUNTERBORE TYPE—

RoHS

RP8TXE (e7)
RP8TXF (f6)



M SUJ2
H 58HRC～
(Induction hardening)

A center hole may remain on the right hand side tip.

H	d	D	D tolerance		Part Number		L 0.1mm increments
			RP8TXE(e7)	RP8TXF(f6)	Type	D	
20	10.5	15	−0.032 −0.050	−0.016 −0.027	**RP8TXE** (e7) **RP8TXF** (f6)	15	100.0～ 400.0
25		20	−0.040 −0.061	−0.020 −0.033		20	100.0～ 600.0
30	15.5	25				25	100.0～ 700.0
35	20.5	30				30	100.0～ 700.0
40	25.5	35	−0.050 −0.075	−0.025 −0.041		35	100.0～ 700.0

Order

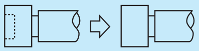
Part Number	—	L
RP8TXE20	—	582.5

Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	L	—	(NCH)
RP8TXE15	—	106.5	—	NCH

Alteration	Code	Spec.	1Code
	NCH	Changes to no counterbore type.	Quotation

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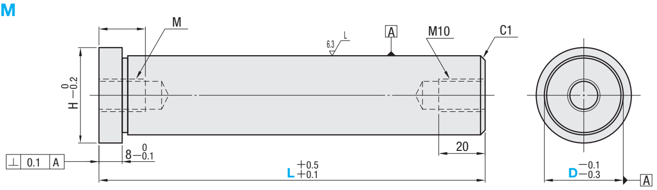
RETURN PINS FOR MIDDLE・LARGE MOLD

—TAPPED TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

RP8TSM



M S45C
(Unannealed steel)

H	Head Tap size		Part Number		L 1mm increments
	M	ℓ	Type	D	
30	8	15	**RP8TSM**	25	100～ 700
35	10	20		30	100～ 700
37				32	100～ 700
45				40	100～ 700

If RP8TSM is used with a return pin coil spring, there may be a case where the spring get scratched and destroyed.
Make sure to take this into account when selecting it.

Order

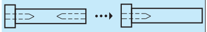
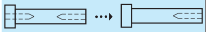
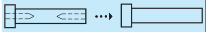
Part Number	—	L
RP8TSM30	—	342

Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	L	—	(NM1・NM2・NM3)
RP8TSM25	—	199	—	NM1

Alterations	Code	Spec.	1Code
	NM1	Leaves the tip without a tap. ⊗ Combination with NM2・NM3 not available	Quotation
	NM2	Leaves the head without a tap. ⊗ Combination with NM1・NM3 not available	
	NM3	Leaves the tip and head without taps. ⊗ Combination with NM1・NM2 not available	

EARLY RETURN UNITS FOR EJECTOR PLATE

—GUIDE—

■What is the Early Return Units for Ejector Plate?

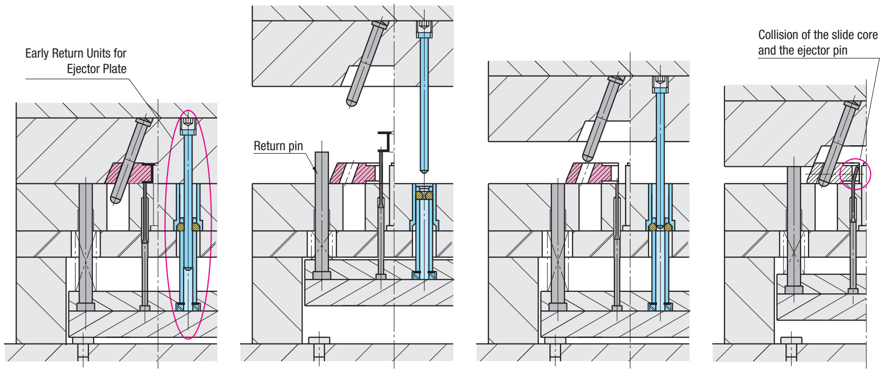
- In the case that there is an ejector pin within the movement range of the slide core, there might be a collision of the ejector pin and the slide core before the slide core returns to its initial position in the mold closing process even if you use a return pin, which could result in serious damage. (Refer to Fig.1—④) Usually, the ejector plate is supposed to return by the return pin and spring. However, a malfunction could also occur in the following cases.
  1) Scoring on the ejector pin and return pin
  2) Breakage and fatigue on the spring
  3) The long stroke of the ejector pin hinders the plate from returning to its initial position by the spring

The Early Return Units for Ejector Plate are intended to push down the ejector plate earlier than the return pin in order to prevent the slide core and ejector pin from colliding.

■Features

- This is embedded into the unit, which is space-saving and easy to mount. Early return can be ensured even when eject stroke of the ejector pin is rather long.
- The length of the bushing/cam rod and bushing pins can be specified in 1mm/0.5mm and 0.01mm respectively, which allows an easy mounting to the mold.
- This can be used for the two-step ejector.

■Fig.1: Example of activation of early return units for ejector plate


Early Return Units for Ejector Plate
Return pin
Collision of the slide core and the ejector pin

① Mold closed

② Ejection of ejector plate

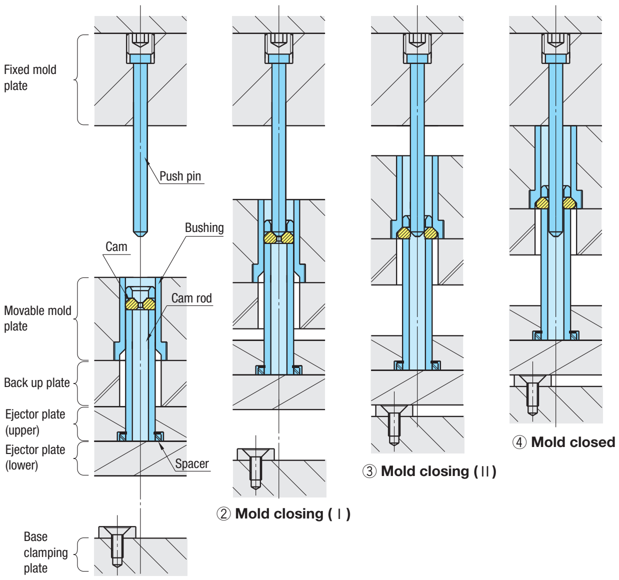
③ Mold closing (early return unit)

④ Mold closing (without early return unit)

■Notes

- Use the unit with the ejector leader pin, ejector leader bushing, return pin, and coil spring for returning.
- Use the unit in two sets or more.
- Apply grease regularly to the cam and sliding surface.
- Refer to P.1311 for calculation of the buckling strength of the push pin, and use the unit with the safety rate of 3 and above.
- Be sure to correctly insert the push pin into the cam rod. Incorrect insertion could damage the mold.
- Incorrect selection of the length of the cam rod/bushing/push pin could cause malfunction.

■Fig.2: Movements of the early return units for ejector plate



① Mold opened

② Mold closing (I)

③ Mold closing (II)

④ Mold closed

[Early return unit]

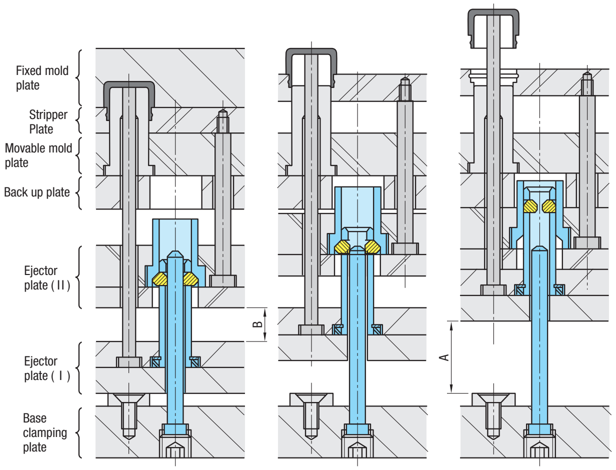
① Mold opening
(During ejection of the ejector plate) The cam in the cam rod is moving along the inside wall of the bushing.

② Mold closing (I)
The cam is pushed by the push pin as the movable mold plate moves, which triggers the return of the ejector plate.

③ Mold closing (II)
Almost at the same time that the ejector plate returns to its initial position, which accompanied the cam pushed by the push pin, the cam evacuates to the space at the end of the bushing.

④ Mold closed
The push pin is inserted into the cam rod without interference of the cam, which cleared the way for the push pin. That completes the mold closing without breakage.

■Fig.3: Activation condition of two-step ejection unit



① Mold opened

② First-step ejection

③ Second-step ejection

[Two-step ejection unit]

Use the unit when it is difficult to eject the finished products with one-step ejection/ when you want to have the finished products automatically fall.

① Mold opening→First-step ejection
When the ejector plate (I) is ejected, both the bushing and ejector plate (II) are ejected, in turn, by the cam rod and cam.

② First-step ejection
When the cam passes over the adjusting pin (push pin) , the cam moves to inside the cam rod, which stops ejection of the ejector plate (II).

③ Second-step ejection
Further ejection of the ejector plate (I) adds to the amount of ejection: the difference between A and B is the amount of the second-step ejection.

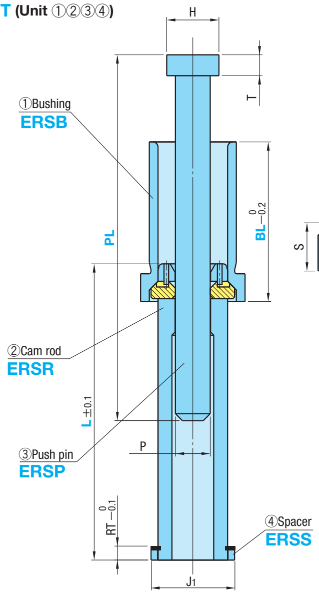
④ Return distance
Please note that the operation error occurs if plate (II) is not operated after plate (I) completely goes down.

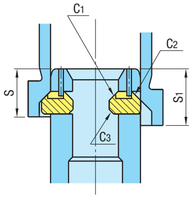
EARLY RETURN UNITS FOR EJECTOR PLATE

❗ Non JIS material definition is listed on P.1351 - 1352

RoHS

ERST (Unit ①②③④)



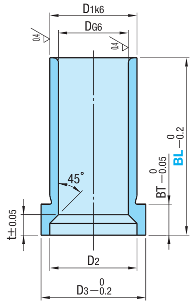


No.	S	S1
5・6	10.5	12
10		12.5
16	16.5	19

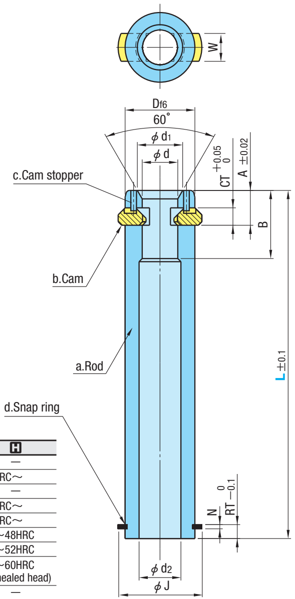
The values of activation finishing/starting point S/S1 are for reference only.

— Components —

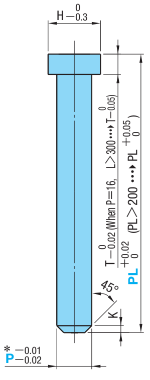
①Bushing ERSB



②Cam rod ERSR

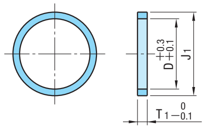


③Push pin ERSP


H $^{0}_{-0.3}$
T $^{0}_{-0.02}$ (When P=16, L>300 ⋯▸ T $^{0}_{-0.05}$)
PL $^{+0.02}_{0}$ (PL>200 ⋯▸ PL $^{+0.05}_{0}$)
45°
K
＊ P $^{-0.01}_{-0.02}$

(When P=16, P $^{0}_{-0.02}$)

④Spacer ERSS



No.	Part Number		Product name	M	H
①②③④	ERST		Unit	—	—
①	ERSB		Bushing	SUJ2	58HRC~
②	ERSR		Cam rod	—	—
	Components	a	Rod	SUJ2	58HRC~
		b	Cam	SKS3	58HRC~
		c	Cam stopper	SUS420J	42~48HRC
		d	Snap ring	Spring steel	45~52HRC
③	ERSP		Push pin	SKH51	58~60HRC (Annealed head)
④	ERSS		Spacer	S45C	—

Part Number		①Bushing						②Cam rod (Set of a, b, c, and d)													
Type	No.	DG6	D1k6	D2	D3	BT	t	d	d1	d2	Df6	C1	C2	C3	J	N	RT	CT	A	B	W
ERST	5	$12^{+0.017}_{+0.006}$	$16^{+0.015}_{+0.002}$	16	19	8	5.5	5	6.8	7	$12^{-0.016}_{-0.027}$	1.5	1.5	1	16	1	4	5	10	15	4.4
	6	$15^{+0.017}_{+0.006}$	$20^{+0.015}_{+0.002}$	19	24			6	8	8	$15^{-0.016}_{-0.027}$				18.6					18	5.6
	10	$20^{+0.020}_{+0.007}$	$25^{+0.015}_{+0.002}$	25	30			10	12	12	$20^{-0.020}_{-0.033}$	2	2	1	24.5	1.2				25	9
	16	$30^{+0.020}_{+0.007}$	$40^{+0.018}_{+0.002}$	36	46	13	8.5	16	19	18	$30^{-0.020}_{-0.033}$	2.5	2.5	1.5	35.5	1.5	8	8	16	32	14

③Push pin				④Spacer			Part Number		①Length of bushing	②Length of cam rod	③Length of push pin
P	H	T	K	D	J1	T1	Type	No.	BL 1mm increments	L 0.5mm increments	PL 0.01mm increments
5	8	6	1.5	12	16	3	ERST	5	20~ 50	50.0~100.0	50.00~150.00
6	10	6	2	15	18.8			6	25~ 60	50.0~100.0 100.5~125.0	50.00~200.00
10	15	8	2	20	24.5	2.8		10	35~100	60.0~100.0 100.5~160.0	50.00~300.00
16	21	8	4	30	35.5	6.5		16	40~100	60.0~100.0 100.5~160.0	50.00~350.00

■ Units (①②③④)

Part Number				U/Price／1~9		
Type	No.	BL	L \ PL	50.00~150.00	150.01~250.00*1	250.01~350.00*2
ERST	5	20~ 50	50.0~100.0		Quotation	
	6	25~ 40	50.0~100.0 100.5~125.0			
		41~60	50.0~100.0 100.5~125.0			
	10	35~ 40	60.0~100.0 100.5~160.0			
		41~ 60	60.0~100.0 100.5~160.0			
		61~ 80	60.0~100.0 100.5~160.0			
		81~100	60.0~100.0 100.5~160.0			
	16	40	60.0~100.0 100.5~160.0			
		41~ 60	60.0~100.0 100.5~160.0			
		61~ 80	60.0~100.0 100.5~160.0			
		81~100	60.0~100.0 100.5~160.0			

*1 The length of push pin ERST6 is PLmax.=200 *2 The length of push pin ERST10 is PLmax.=300

■Components (Unit)

①Bushing

Part Number		BL	U/Price 1~9			
Type	No.	1mm increments	BL25~40	BL41~60*	BL61~80	BL81~100
ERSB	5	20~ 50		Quotation		
	6	25~ 60				
	10	35~100				
	16	40~100				

* ERSB5 bushing length is BLmax.=50

②Cam rod (Set of a, b, c, and d)

Part Number		L	U/Price 1~9	
Type	No.	0.5mm increments	L50.0~100.0	L100.5~160.0
ERSR	5	50.0~100.0	Quotation	
	6	50.0~125.0		
	10	60.0~160.0		
	16	60.0~160.0		

③Push pin

Part Number		BL	U/Price 1~9		
Type	No.	0.01mm increments	PL50.00~150.00	PL150.01~250.00*1	PL250.01~350.00*2
ERSP	5	50.00~150.00		Quotation	
	6	50.00~200.00			
	10	50.00~300.00			
	16	50.00~350.00			

*1 The length of push pin ERST6 is PLmax.=200
*2 The length of push pin ERST10 is PLmax.=300

④ Spacer

Part Number		U/Price
Type	No.	1~9
ERSS	5	Quotation
	6	
	10	
	16	

Order

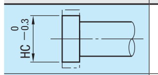
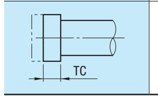
Part Number		BL		L		PL
ERST 10	—	BL50	—	L128.5	—	PL180.00
ERSB 10	—	BL50				
ERSR 10			—	L123.5		
ERSP 10					—	PL160.00
ERSS 10						

Days to Ship Quotation

Price Quotation

Alterations

Part Number		BL		L		PL		(HC・TC)
ERST10	—	BL48	—	L120.5	—	PL152.00	—	TC5
ERSP10					—	PL162.00	—	HC13

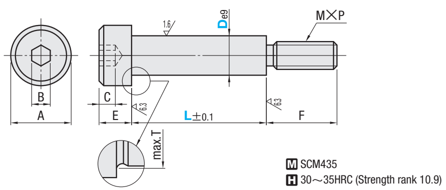
Alterations	Code	Spec.	1Code
	HC	Head diameter change HC=0.1mm increments P+1≦HC<H ❗ Available for ERST/ERSP	Quotation
	TC	Head thickness change TC=0.1mm increments ❗ T/2≦TC<T Dimension PL remains unchanged. ❗ T−TC≦PLmax.−PL ❗ Available for ERST/ERSP	

BOLTS FOR EJECTOR PLATE SET

Non JIS material definition is listed on P.1351 - 1352

RoHS

EPB



M SCM435
H 30∼35HRC (Strength rank 10.9)
S Black Oxide, head only

De9		A	B	C	E	F	M×P	T
10	−0.025 −0.061	16	6	4	8	16	M 8×1.25	10.8
13	−0.032 −0.075	18	8	5	10	20	M10×1.5	14
16		24	10	7	14	24	M12×1.75	17
20	−0.040 −0.092	27	14	9	18	32	M16×2.0	21
25		33	17	11	19	40	M20×2.5	26

Part Number		L	U/Price	
Type	D		1∼19	20∼29
EPB	10	31 36 41 46 51 56 61	Quotation	
	13	31 36 41 46 51 56 61 66 71		
	16	51 56 61 66 71 76 81 91 101 111 121 131		
	20	61 66 71 76 81 91 101 111 121 131 141		
	25	121 131 141 151 161		

No knurling on the head.

To be quoted on price & lead time above Max. Q'ty.

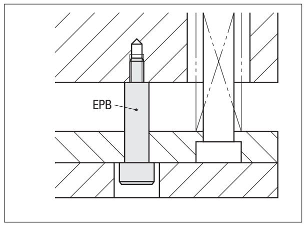
Order

Part Number	—	L
EPB10	—	51

Days to Ship Quotation

Example

- Use when pushing up and fixing the ejector plate such as when setting or replacing the ejector pin.
- Because the L dimension is an integral number of 5mm units +1mm according to the space which is incremented in 5-mm steps, the mold can be installed in the molding machine without any need to counterbore the upper side of the ejector plate.
- Because the threaded part (F dimension) is somewhat long, it is possible to easily set the ejector plate without subjecting it to the load from the spring.



■ F dimension comparison table

D	M×P	F	
		EPB	Shoulder bolts MSB · MSBL (P.1191∼1192)
10	M 8×1.25	16	12
13	M10×1.5	20	16
16	M12×1.75	24	18
20	M16×2.0	32	24
25	M20×2.5	40	30

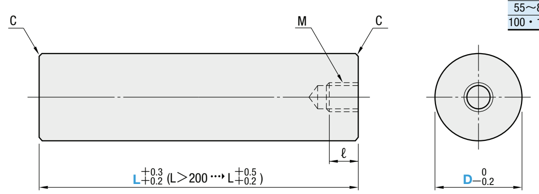
SUPPORT PILLARS

—TAPPED TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

SPL



$L^{+0.3}_{+0.2}$ (L>200 ⋯→ $L^{+0.5}_{+0.2}$)

$D^{0}_{-0.2}$

D	C
12~18	0.3
20~50	0.5
55~80	0.8
100・120	1.2

Black oxide on surface of the left tip (opposite side of the tap) may be removed depending on the designated length.

M S45C
S Black Oxide

M × Pitch	ℓ	Part Number Type	D	L 5mm increments	L 10mm increments	U/Price 1~9
M6 × 1.0	12	SPL	12	40~55	60~ 70	Quotation
				—	80~100	
			14	40~55	60~ 70	
				—	80~120	
			16	40~55	60~ 70	
				—	80~120	
			18	40~55	60~ 70	
				—	80~120	
			20	45~55	60~ 70	
				—	80~120	
					130~150	
M8 × 1.25	16		25	45~55	60~ 80	
				—	90~120	
					130~150	
			30	—	50~ 80	
					90~120	
					130~160	
					170~200	
					210~250	
					260~300	
			32	—	50~ 80	
					90~120	
					130~160	
					170~200	
					210~250	
					260~300	
			35	—	50~ 90	
					100~120	
					130~150	
					160~180	
					190~210	
					220~250	
					260~300	
			40	—	50~ 90	
					100~120	
					130~150	
					160~180	
					190~210	
					220~250	
					260~300	
			45	—	50~ 90	
					100~120	
					130~170	
					180~200	
			50	—	50~ 90	
					100~120	
					130~170	
					180~200	
					210~250	
					260~300	
					310~350	
					360~400	
M12 × 1.75	24	SPL	55	—	50~ 90	Quotation
					100~120	
					130~170	
					180~200	
			60	—	70~ 90	
					100~120	
					130~170	
					180~200	
					210~250	
					260~300	
					310~350	
					360~400	
			80	—	70~ 90	
					100~120	
					130~170	
					180~200	
					210~250	
					260~300	
					310~350	
					360~400	
M16 × 2.0	32		100	—	100~120	
					130~150	
					160~180	
					190~200	
			120	—	100~120	
					130~150	
					160~180	
					190~200	

Order

Part Number	—	L
SPL32	—	80

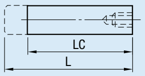
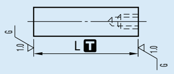
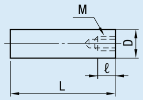
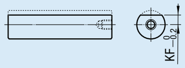
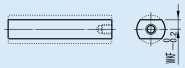
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L(LC)	—	(LKC・MC⋯etc.)
SPL32	—	LC 75	—	LKC — MC10

- D=12~40・50
  Quotation
- D=45・55・60・80・100・120
  Quotation

Alterations	Code	Spec.	1Code
 LC L	LC	Changes the full length. LC=1mm increments Combining LKC makes designation of 0.01mm increments possible. Cut face is not surface-treated.	Quotation
 G 1.0 L T 1.0 G	LKC	Changes L dimension tolerance. Available for L40~L350 40≦L≦200 ⋯→ $L^{+0.3}_{+0.2}$ ⋯→ $^{+0.02}_{0}$ 200<L≦350 ⋯→ $L^{+0.5}_{+0.2}$ ⋯→ $^{+0.03}_{0}$ Makes LC alteration in 0.01mm increments possible. All pieces are ground together when 8 pieces or less are ordered for LKC. (Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range.) Both ends are not surface-treated	
 M D ℓ L	MC	Changes the tap size. ℓ=M×2	
 KF $^{0}_{-0.2}$	KF	Cuts dimension D as the figure, then performs surface treatment (Black Oxide). KF=1mm increments $\frac{M}{2}+1 \leqq KF \leqq \frac{D}{2}-1$	
 WKF $^{0}_{-0.2}$	WKF	Cuts dimension D as the figure, then performs surface treatment (Black Oxide). WKF=1mm increments $\frac{M}{2}+1 \leqq WKF \leqq \frac{D}{2}-1$	

D	LC
12	20≦LC<100
14	20≦LC<120
16	
18	
20	20≦LC<150
25	
30	40<LC<300
32	

D	LC
35	40<LC<300
40	
45	40<LC<200
50	40<LC<400
55	40<LC<200
60	60<LC<400
80	
100	60<LC<200
120	

D	Tap M selection
12	5
14	
16	8・10
18	
20	
25	10・12
30	
32	

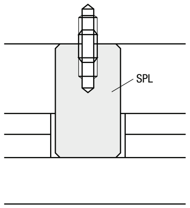
D	Tap M selection
35	10・12
40	
45	
50	
55	16
60	
80	
100	20
120	

⊗ **KC・WKC・KF・WKF** combination not available.

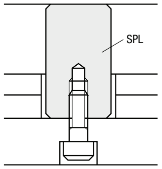
Example

To use with a screw plug (MSWC) screwed into the support pillar

Make a drill hole for rough positioning on the backup plate and insert the support pillar into it as shown in the figure. Then tighten the bottom clamping plate.



To fix the support pillar on a bottom clamping plate with a bolt.



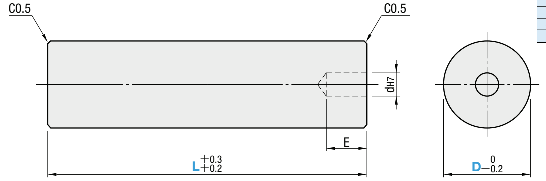
SUPPORT PILLARS

—DOWEL HOLE TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

SPLG



■Supplied Dowel Pin

D	Dowel pin
20	MSTH 8—25
25 30 35 40	MSTH10—30
50	MSTH10—35

- SPLG is attached dowel pin.
- Black oxide on surface of the left tip (opposite side of the dowel hole) may be removed depending on the designated length.

M S45C
S Black Oxide

d_{H7}		E	Part Number		L	U/Price
			Type	D	10mm increments	1～9
8	$^{+0.015}_{0}$	15	SPLG	20	40	Quotation
					50	
					60	
					70	
					80	
					90	
					100	
10		20		25	50	
					60	
					70	
					80	
					90	
					100	
				30	50	
					60	
					70	
					80	
					90	
					100	
					110	
					120	
				35	50	
					60	
					70	
					80	
					90	
					100	
					110	
					120	
					130	
					140	
					150	
10	$^{+0.015}_{0}$	20	SPLG	40	50	Quotation
					60	
					70	
					80	
					90	
					100	
					110	
					120	
					130	
					140	
					150	
				50	70	
					80	
					90	
					100	
					110	
					120	
					130	
					140	
					150	
					160	
					170	
					180	
					190	
					200	

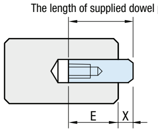
Order

Part Number	—	L
SPLG35	—	80

Days to Ship Quotation

Price Quotation

■Support Pillar —Dowel hole— Example of setting

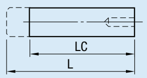
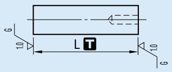
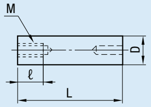
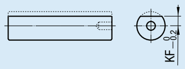
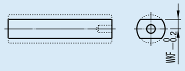


Part Number	D	The length of supplied dowel pin	E	X
SPLG	20	25	15	10
	25～40	30	20	10
	50	35	20	15

- The supplied dowel pin is not set when delivering. Please use it combining with the support pillar.

Alterations

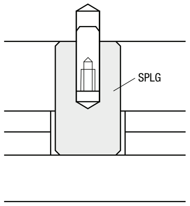
Part Number	—	L(LC)	—	(LKC・MC···etc.)
SPLG35	—	LC 75	—	LKC — MC10

Alterations	Code	Spec.	1Code
	LC	Changes the full length. LC=1mm increments Combining LKC makes designation of 0.01mm increments possible. D 20, 25: 40≦LC<100 D 30: 50<LC<120 D 35, 40: 50<LC<150 D 50: 70<LC<200 Cut face is not surface-treated.	Quotation
	LKC	Changes L dimension tolerance. $L^{+0.3}_{+0.2} \cdots\rightarrow {}^{+0.02}_{0}$ Makes LC alteration in 0.01mm increments possible. All pieces are ground together when 8 pieces or less are ordered for LKC. (Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range.) Both ends are not surface-treated	
	MC	Adds tapping D 20: Tap M selection 8・10 D 25, 30, 35, 40, 50: Tap M selection 10・12 Available for 50≦L. ℓ=M×2	
	KF	Cuts dimension D as the figure, then performs surface treatment (Black Oxide). KF=1mm increments $\frac{d}{2}+1 \leqq KF \leqq \frac{D}{2}-1$	
	WKF	Cuts dimension D as the figure, then performs surface treatment (Black Oxide). WKF=1mm increments $\frac{d}{2}+1 \leqq WKF \leqq \frac{D}{2}-1$	

⊗ **KC・WKC・KF・WKF** combination not available.

Example

Installation and removal become easier due to fixing the support pillar by dowel pin.



SUPPORT PILLARS

—BOLT HOLE TYPE—

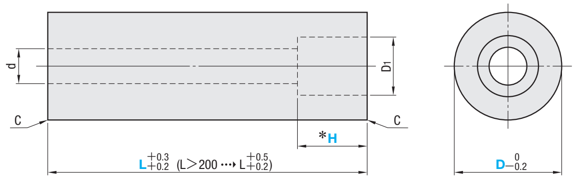
Non JIS material definition is listed on P.1351 - 1352

RoHS

DSPL (Standard type)

DSF (Free designation type)

D	C
16 · 18	0.5
20～ 35	0.8
38～ 60	1.0
80～120	1.5



* Designation of H available for **DSF** only.

Black oxide on surface of the left tip (opposite side of the counterbore) may be removed depending on the designated length.

M S45C
S Black Oxide

■Standard Type

Applicable bolt size M	Bolt hole H	Bolt hole D1	Bolt hole d	Part Number Type	Part Number D	L 10mm increments
M 6	7	11	7	DSPL	16	20～100
					18	
M 8	9	14	9		20	40～150
					25	
					30	
M10	13	18	11		35	
M12	15	20	14		40	40～250
M16	19 70 when L≧300	26	18		50	40～300
					60	40～350
					80	

■Free Designation Type

Part Number Type	Part Number D	L 1mm increments	Applicable M bolt sizes							H 1mm increments
DSF	16	20～100	5	6						6～50 L−H≧6
	18		5	6						
	20	20～150 When LK1/LK2 is used ⋯L=0.01mm increments possible	5	6	8					
	25			6	8	10				
	30			6	8	10	12			
	32				8	10	12			
	35				8	10	12			
	38	30～200				10	12	16		
	40					10	12	16		
	50						12	16	20	
	60						12	16	20	
	80							16	20	
	100	40～200						16	20	
	120							16	20	

Applicable bolt size M	Bolt hole D1	Bolt hole d
M 5	10	6
M 6	11	7
M 8	14	9
M10	18	11
M12	20	14
M16	26	18
M20	32	22

Order

	Part Number	—	L	—	M	—	H
(Standard type)	DSPL60	—	200				
(Free designation type)	DSF 40	—	195	—	M16	—	H20

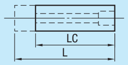
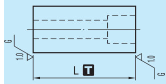
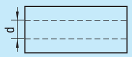
Days to Ship Quotation

Price Quotation

Alterations

(Standard type) Part Number — L(LC) — (LK1 · LK2)
DSPL60 — LC195 — LK1

(Free designation type) Part Number — L — M — H(HN) — (LK1 · LK2)
DSF40 — 195.00 — M16 — HN — LK1

Alterations	Code	Spec.	1Code
	LC	Changes the L dimension. LC=1mm increments Available for DSPL only Cut face is not surface-treated. Lmin.<LC<Lmax.	Quotation
	LK1	Changes L dimension tolerance. L≦200 ⋯ $L^{+0.3}_{+0.2}$ ⋯ $L^{+0.02}_{0}$ L>200 ⋯ $L^{+0.5}_{+0.2}$ ⋯ $L^{+0.03}_{0}$ Makes L designation in 0.01mm increments possible. Both ends are not surface-treated For DSPL, LC=0.01mm increments possible when LC is combined.	
	LK2	Changes L dimension tolerance. L≦200 ⋯ $L^{+0.3}_{+0.2}$ ⋯ $L^{0}_{-0.02}$ L>200 ⋯ $L^{+0.5}_{+0.2}$ ⋯ $L^{0}_{-0.03}$ Makes L designation in 0.01mm increments possible. Both ends are not surface-treated For DSPL, LC=0.01mm increments possible when LC is combined.	
	HN	Makes a through bolt hole without counterbore. The penetration hole diameter becomes d. Available for DSF only	

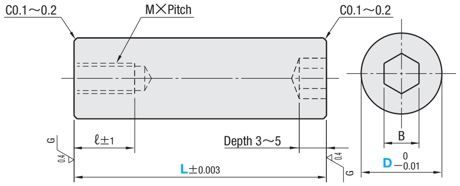
All pieces are ground together when 8 pieces or less are ordered for LK1/LK2.
(Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range).

SUPPORT PILLARS

—FULLY QUENCHED TYPE—

RoHS

HSP (L dimension selection type)
HSPL (L dimension designation type)



D	Possible number of simultaneous grinding
6~12	100
14・16	70
18・20	50

With order number more than stated on the left, simultaneous grinding will be done in half.
ex) HSP8 When order is for 130 pieces, 65 pieces each will be simultaneously ground.

M SKD11(High temperature return)
H 56~58HRC
(Sub-zero treated)

We will also simultaneously grind from 1 order.

■L Dimension Selection Type

M×Pitch	ℓ	B	Part Number Type	Part Number D	L	U/Price 1~19
M3×0.5	5	3	HSP	6	30	Quotation
				7.5		
M4×0.7	6	4		8		
				10		
		6		12		
				14		
				16		
		10		20		

■L Dimension Designation Type

M×Pitch	ℓ	B	Part Number Type	Part Number D	L 0.01mm increments	U/Price 1~19
M3×0.5	5	3	HSPL	6	20.00~40.00	Quotation
				7.5		
M4×0.7	6	4		8		
				10		
		6		12		
				14		
				16		
		10		20		

Order

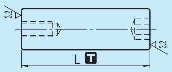
Part Number — L
HSP7
HSPL8 — 30.01

Days to Ship Quotation

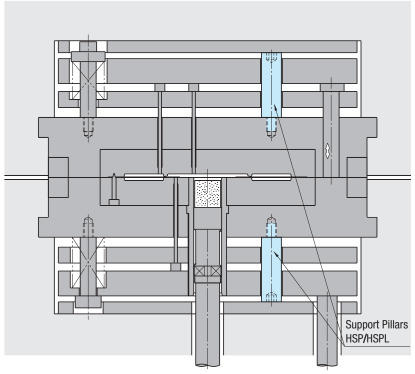
Price Quotation

Alterations

Part Number — L — (NLK)
HSPL8 — 30.01 — NLK

Alteration	Code	Spec.	1Code
	NLK	No grinding on L dimension ±0.003 ···› L $^{+0.3}_{+0.1}$	Quotation

Example

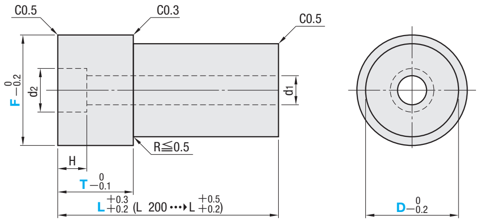


STEPPED SUPPORT PILLARS

Non JIS material definition is listed on P.1351 - 1352

RoHS

SPLF



Black oxide on surface of the right tip (opposite side of the counterbore) may be removed depending on the designated length.

M S45C
S Black Oxide

Applicable bolt size (M)	Bolt hole H	Bolt hole d2	Bolt hole d1	Part Number Type	Part Number D	L 0.1mm increments	F	T 0.1mm increments	U/Price 1~9
M 6	9	11	7	SPLF	20	45.0~ 90.0	25	10.0~45.0 L>T	Quotation
						90.1~150.0			
						45.0~ 90.0	30		
						90.1~150.0			
					25	45.0~ 90.0	30		
						90.1~150.0			
						45.0~ 90.0	35		
						90.1~150.0			
M 8	11	14	9		30	50.0~100.0	35		
						100.1~150.0			
						150.1~200.0			
						50.0~100.0	40		
						100.1~150.0			
						150.1~200.0			
M10	14.5	18	11		35	50.0~100.0	40		
						100.1~150.0			
						150.1~200.0			
						200.1~250.0			
						50.0~100.0	50		
						100.1~150.0			
						150.1~200.0			
						200.1~250.0			

Applicable bolt size (M)	Bolt hole H	Bolt hole d2	Bolt hole d1	Part Number Type	Part Number D	L 0.1mm increments	F	T 0.1mm increments	U/Price 1~9
M12	16.5	20	14	SPLF	40	50.0~100.0	45	10.0~45.0 L>T	Quotation
						100.1~150.0			
						150.1~200.0			
						200.1~250.0			
						50.0~100.0	55		
						100.1~150.0			
						150.1~200.0			
						200.1~250.0			
M16	22	25	18		50	50.0~100.0	55		
						100.1~150.0			
						150.1~200.0			
						200.1~250.0			
						250.1~300.0			
						50.0~100.0	65		
						100.1~150.0			
						150.1~200.0			
						200.1~250.0			

Order

Part Number — L — F — T
SPLF20 — 92.5 — F30 — T22.5

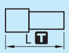
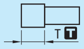
Days to Ship Quotation

Price Quotation

Alterations

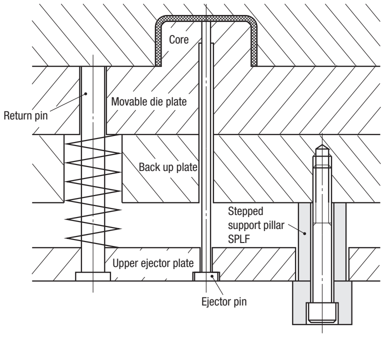
Part Number — L — F — T — (LKC・TKC)
SPLF20 — 90 — F25 — T30 — LKC

Quotation

Alterations	Code	Spec.	1Code
	LKC	Changes L dimension tolerance. Makes L designation in 0.01mm increments possible. L$^{+0.3}_{+0.2}$ → L≦200 ···› L$^{+0.02}_{0}$ L>200 ···› L$^{+0.03}_{0}$	Quotation
	TKC	Changes T dimension tolerance. Makes T designation in 0.01mm increments possible. T$^{0}_{-0.1}$···› T$^{0}_{-0.05}$	

- All pieces are ground together when 8 pieces or less are ordered for LKC.
  (Although the tolerance of L dimension is as indicated, its dispersion is kept within a 0.01 range.)
- Alteration LKC inevitably deletes surface treatment on both ends of the product.
- Alteration TKC inevitably deletes surface treatment on the left end of the product.

Example

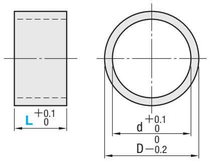


When assembling molds, the support pillar's stepped part holds down the upper ejector plate and keeps it in parallel, a ejector pin can be inserted easily.
(Enables smooth installation without requiring the plate held down by hands or a return pin suspended from above.)

Stroke adjustment collars for ejector plate

RoHS

SPLC


L +0.1 0
d +0.1 0
D 0 −0.2

Black oxide on surface on one end of the product may be removed depending on the designated length.

M SS400 S Black Oxide

Applicable external diameters of ejector leader pins	d	D	Part Number Type	Part Number No.	L 1mm increments	U/Price 1~19
8	8.1	11.5	SPLC	8	5~30	Quotation
10	10.1	13.5		10		
12	12.1	15.5		12		
13	13.1	16.5		13		
16	16.1	19.5		16		
20	20.1	23.5		20		
25	25.1	28.5		25		

Order

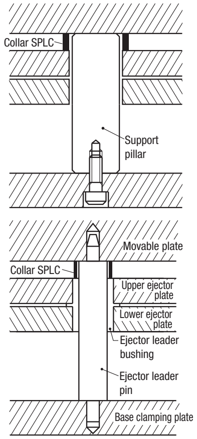
Part Number	—	L
SPLC13	—	10

Days to Ship Quotation

Price Quotation

ex Example ■ **Benefit** This collar functions as an ejector plate stopper.

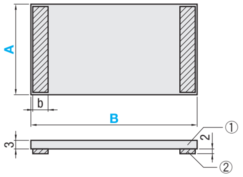
(When the finished product is protruded)


Collar SPLC
Support pillar
Movable plate
Collar SPLC
Upper ejector plate
Lower ejector plate
Ejector leader bushing
Ejector leader pin
Base clamping plate

Covers for ejector space

RoHS

AEC



■Dimension of a magnet

B	b
100~300	10
310~600	20

M ①Acrylic Resin
②Rubber Magnet

Temperature to be used −20~80°C

Part Number Type	Part Number A	B 10mm increments	U/Price 1~9 B 100~200	210~300	310~400	410~500	510~600
AEC	50	100~200	Quotation	—	—	—	—
	60						
	70	100~300					
	80						
	90	100~500					
	100						
	110	210~500	—				
	120						
	130						
	150	310~500		—			
	170						
	200	310~600					

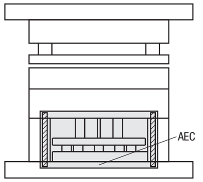
Order

Part Number	—	B
AEC70	—	210

Days to Ship Quotation

Price Quotation

ex Example



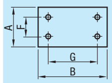
Features

- Attaching the cover for ejector space prevents foreign substances from entering.
- It is a magnet type which is easy to remove.
- Since the cover is transparent, it does not need to be removed to see ejector space.

Alterations

Part Number	—	B	—	(BT)
AEC70	—	210	—	BT5—F50—G100

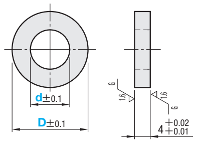
Quotation

Alteration	Code	Spec.	1Code
	BT	Remove the magnets, changes to bolt holes type.) Adds 4-bolt holes. Designation method BT5—F50—G100 BT=Select bolt nominal dia.(table) F・G=1mm increments d+5≦F≦A−d−5 d+5≦G≦B−d−5 No. / d: 3 / 3.5; 4 / 4.5; 5 / 5.5; 6 / 6.5; 8 / 9; 10 / 11	Quotation

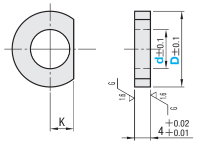
Non JIS material definition is listed on P.1351 - 1352

RoHS

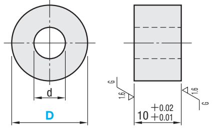
SPW Spacer rings


d±0.1
D±0.1
G
1.6
1.6
G
4 +0.02 +0.01

SPWG Spacer rings (segmental type)


K
d±0.1
D±0.1
G
1.6
1.6
G
4 +0.02 +0.01

SPWD Spacer rings (for die cast)


d
D
G
1.6
1.6
G
10 +0.02 +0.01

M S45C (unannealed steel)

Part Number Type	Part Number D − d	U/Price 1~49	50~199	200~499	500~1000
SPW	13− 4.5	Quotation			
	13− 5.5				
	13− 6.5				
	16− 6.5				
	16− 8.5				
	20− 8.5				
	20−10.5				
	25−10.5				
	25−12.5				

K	Part Number Type	Part Number D − d	U/Price 1~49	50~199	200~499	500~1000
5	SPWG (Segmental type)	13− 5.5	Quotation			
		13− 6.5				
6		16− 8.5				
7		20−10.5				
8		25−12.5				

d	Part Number Type	Part Number D	U/Price 1~49	50~199	200~499	500~1000
5.5	SPWD (For die cast)	13	Quotation			
6.5		16				
8.5		20				
10.5		25				
12.5		30				

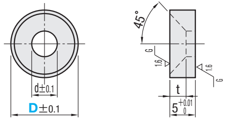
Order

Part Number
SPW 13−5.5
SPWD13

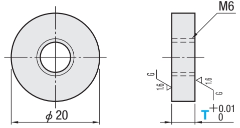
Days to Ship Quotation

RoHS

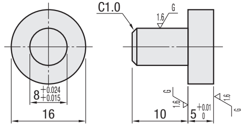
STR Stopper rings (for countersunk bolt)


45°
G
1.6
1.6
G
d±0.1
D±0.1
t
5 +0.01 0

STPB Stopper rings (bolt type)


M6
G
1.6
1.6
G
ϕ20
T +0.01 0

STPH Stopper pins
STPN Stopper pins (unannealed steel)


C1.0
1.6
G
8 +0.024 +0.015
16
G
1.6
10
5 +0.01 0
1.6
G

M S45C H 46~50HRC STPN M S45C (unannealed steel)

t	d	Part Number Type	Part Number D	U/Price 1~49	50~199	200~499	500~1000
3.0	5.5	STR (For countersunk bolt)	16	Quotation			
3.5	6.5		20				
4.5	8.5		25				

Similar product: TPS P.937 TPD P.937 MWFBS P.1200

Part Number Type	Part Number T	U/Price 1~49	50~199	200~499	500~1000
STPB (Bolt type)	5	Quotation			
	10				
	15				

Part Number	U/Price 1~49	50~199	200~499	500~1000
STPH	Quotation			
STPN (Unannealed steel)				

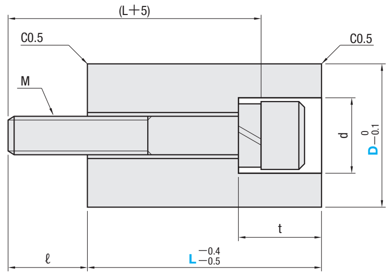
Order

Part Number
STR 16
STPB 5
STPH

Days to Ship Quotation

EJECTOR RODS WITH SPRING WASHER

RoHS **ERDW**



① M S45C
S Black Oxide
② M SCM435
Strength class 12.9
Bolt JIS B0205
③ M SWRH62

d	t	ℓ	M×Pitch	Part Number Type	D	L	U/Price L15・20・25 1~9	10~19	20~49	50~100	U/Price L30・35・40 1~9	10~19	20~49	50~100	U/Price L45・50・60 1~9	10~19	20~49	50~100
8	6.2	10	M 4×0.7	ERDW	15	15 20 25 30 35 40									—			
11	8.6	12	M 6×1.0		20	15 20 25 30 35 40 45 50												
14	11	14	M 8×1.25		25	15 20 25 30 35 40 45 50												
					30	15 20 25 30 35 40 45 50 60												
					32	20 25 30 35 40 45 50 60					Quotation							
					35	20 25 30 35 40 45 50 60												
17	14.5	17	M10×1.5		40	25 30 35 40 45 50 60												
					50	30 35 40 45 50 60	—											
20	16.5	19	M12×1.75		60	30 35 40 50 60	—											

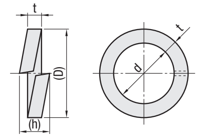
Order
Part Number — L
ERDW20 — 30

Days to Ship **Quotation**

When an ERDW spring washer alone is needed, use CBW described below.

■Spring Washers for Ejector Rod

RoHS **CBW** (Spring washers)



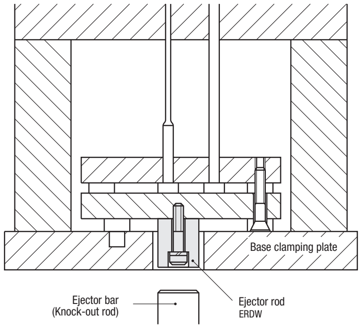
(D): Maximum (h): Minimum
M SWRH62 H 42~50HRC

d	(D)	(h)	t	Part Number Type	No.	U/Price 1~199	200~499	500~1000
4.1	7	2.4	1.2	CBW	4			
6.1	9.9	3.2	1.6		6			
8.1	12.7	4	2		8		Quotation	
10.2	16	5	2.5		10			
12.2	18	5	2.5		12			

Order
Part Number
CBW10

Days to Ship **Quotation**

ex Example

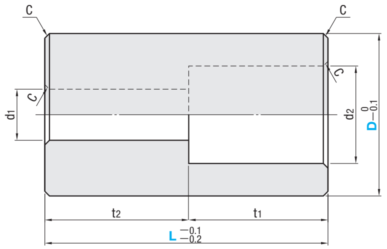


EJECTOR RODS

—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS **ERDFF**
ERDFX



Black oxide on surface of the left tip (opposite side of the counterbore) may be removed depending on the designated length.

M S45C
S Black Oxide

C	Applicable bolts	Bolt hole t1	t2	d1	d2	Part Number Type	D	L 1mm increments	U/Price 1~9 L15~50	L51~80
0.5	M 4	6.2	(L−6.2)	4.5	8	ERDFF	15	15~ 60		
	M 6	9	(L−9)	7	11		20			
	M 8	11	(L−11)	9	14		25	20~ 80		
							30			
							32		Quotation	
							35			
	M10	14.5	(L−14.5)	11	17		40	25~ 80		
							50	30~ 80		
0.8	M12	16.5	(L−16.5)	14	20		60			

C	Applicable bolts	Bolt hole t1	t2	d1	d2	Part Number Type	D	L 5mm increments	U/Price 1~9 L50	L55~100	L105~150	L155~200
1.0	M 8	(L−20)	20	9	14	ERDFX	25	50~200				
							35			Quotation		
	M10			11	17		55					
							65					

Order
Part Number — L
ERDFF15 — 27
ERDFX55 — 175

Days to Ship **Quotation**

P Price **Quotation**

EJECTOR PLATE RETURN DETECTION SWITCHES

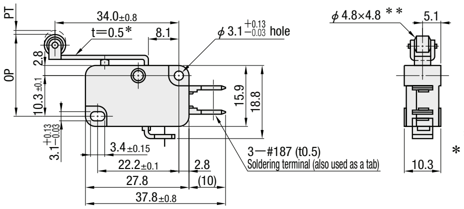
①

②

③

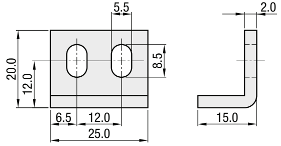
RoHS

①V—156—1A5—T (Microswitch: Hinged roller lever)

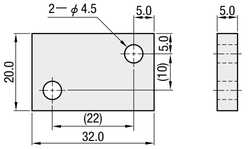

PT
OP
34.0±0.8
t=0.5*
8.1
ϕ3.1$^{+0.13}_{-0.03}$ hole
2.8
10.3±0.1
3.1$^{+0.13}_{-0.03}$
15.9
18.8
3.4±0.15
22.2±0.1
2.8
27.8
(10)
37.8±0.8
3—#187 (t0.5)
Soldering terminal (also used as a tab)
ϕ4.8×4.8 **
5.1
10.3

＊Stainless steel lever
＊＊Oil-free type polyacetal resin roller

②EGS—ANGLE (L-angle plate)


5.5
2.0
20.0
12.0
8.5
6.5
12.0
25.0
15.0

③EGS—BOARD (Heat insulation plate)


2—ϕ4.5
5.0
5.0
5.0
20.0
(10)
(22)
32.0

① Microswitch (hinged roller lever type)

Manufactured by Omron

- Force needed to start 125gf
- Minimum return force 14gf
- Maximum movement till starting PT 4.0mm
- Minimum movement after starting 1.6mm
- Maximum differential motion 1.5mm
- Operation point OP 20.7±1.2mm

Standard

- Rated voltage: 250V • Rated current: 15A
- Heat resistance: up to 150℃

② **M** Steel Plate (SPCC)

③ **M** Bakelite (black)

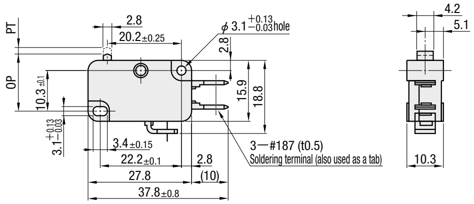
④

⑤

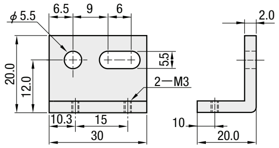
③

RoHS

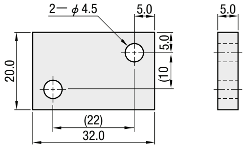
④V—15—1A5—T (Microswitch: Push button)


PT
OP
2.8
20.2±0.25
ϕ3.1$^{+0.13}_{-0.03}$hole
2.8
10.3±0.1
3.1$^{+0.13}_{-0.03}$
15.9
18.8
3.4±0.15
22.2±0.1
2.8
27.8
(10)
37.8±0.8
3—#187 (t0.5)
Soldering terminal (also used as a tab)
4.2
5.1
10.3

⑤EGS—AV (L-angle plate for push button type microswitch)


ϕ5.5
6.5
9
6
2.0
20.0
12.0
5.5
2—M3
10.3
15
30
10
20.0

③EGS—BOARD (Heat insulation plate)


2—ϕ4.5
5.0
5.0
5.0
20.0
(10)
(22)
32.0

④ Microswitch (push button type)

Manufactured by Omron

- Force needed to start 200gf
- Minimum return force 50gf
- Maximum movement till starting PT 1.2mm
- Minimum movement after starting 1.0mm
- Maximum differential motion 0.4mm
- Operation point OP 14.7±0.4mm

Standard

- Rated voltage: 250V • Rated current: 15A
- Heat resistance: up to 150℃

⑤ **M** SPCC
A CB3-20 (1 pc.)
M3 nut (2 pcs.)

③ **M** Bakelite (black)

Non JIS material definition is listed on P.1351 - 1352

Part No.	Part Number	U/Price			
		1~9	10~19	20~49	50~100
Set of ①②③	**EGS** (incl. 2 pcs. of CB5-15)				
Set of ④⑤③	**EGS—V** (incl. 2 pcs. of CB5-15)				
Switch ①	**V—156—1A5—T**				
L-angle plate ②	**EGS—ANGLE**		Quotation		
Heat insulation plate ③	**EGS—BOARD**				
Switch ④	**V—15—1A5—T**				
L-angle plate ⑤	**EGS—AV**				

CB5-15 is included only in the set products.

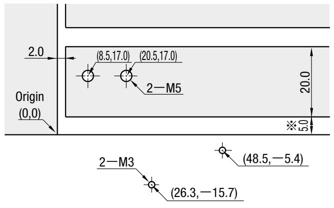
Order	Part Number
	EGS—V

Days to Ship	Quotation

ex Example • **Examples of bolt hole boring on a mold base**

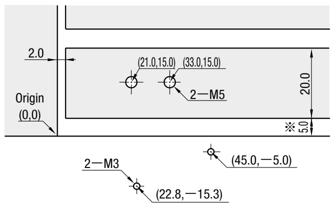
Bolt hole boring examples

■EGS・EGS—V


2.0
Origin
(0,0)
(8.5,17.0)
(20.5,17.0)
2—M5
20.0
※5.0
2—M3
(48.5,—5.4)
(26.3,—15.7)

※An example of using stopper pin・stopper ring ☞ P.1000

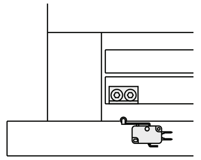
■EGS—V


2.0
Origin
(0,0)
(21.0,15.0)
(33.0,15.0)
2—M5
20.0
※5.0
2—M3
(45.0,—5.0)
(22.8,—15.3)

※An example of using stopper pin・stopper ring ☞ P.1000

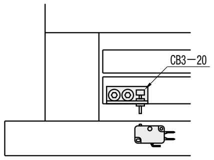
Switch mounting examples

■EGS



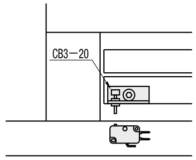
- Adjust the L-angle plate's height for activation/deactivation of the lever.

■EGS—V



- To mount EGS-V on a mold base on which holes for EGS have already been machined, attach the M3 bolt on the right hand side of the L-angle plate.
- Adjust the M3 bolt position for activation/deactivation of the push button.

■EGS—V

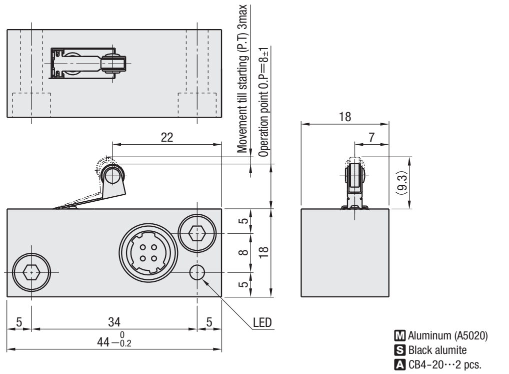


- Adjust the M3 bolt position for activation/deactivation of the push button.
- Attach the M3 bolt on the left hand side of the L-angle plate.
- Use 2 pieces of M5 bolt to attach the L-angle plate.

EJECTOR PLATE RETURN DETECTION SWITCHES

—MOLD SIDE ATTACHMENT TYPE WITH CONNECTOR EMBEDDED HINGED ROLLER LEVER TYPE—

EPRSR—24V



Movement till starting (P.T) 3max
Operation point O.P=8±1
22
18
7
(9.3)
5
8
18
5
5
34
5
44 0 −0.2
LED

M Aluminum (A5020)
S Black alumite
A CB4-20…2 pcs.

Part Number	U/Price 1～9
EPRSR—24V	Quotation

☎ Order

Part Number
EPRSR—24V

Days to Ship: Quotation

P Price: Quotation

■**Features**

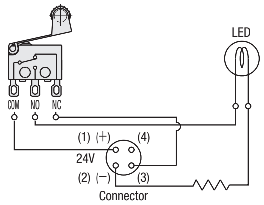
- The ejector plate return detection switch can be mounted just by making a bolt hole on the side of movable installation plate.
- Complicated wiring process is not required due to incorporation of connector. Quick and easy removal is made possible by using special cable EPRSC. Reduces time for mold replacement.
- Since the part of connection with wiring and switch is not exposed, dust and dirt can be prevented, while the risk of wire breakage and electric shock, etc. is reduced.
- LED turns red when the ejector plate returns.

■**Notes**

- Do not apply side force or overstroke towards the lever switch. Moreover, during mold transfer or maintenance, be careful not to apply large force from outside, which may result in damage of switch.

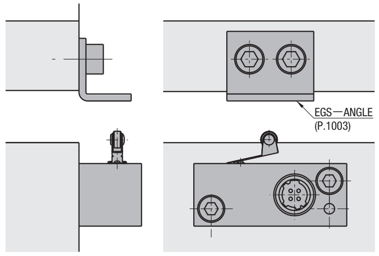
■EPRSR-24V	
Rated voltage	DC24V 1A
Circumferential temperature to be used	−40～85℃
Force needed to start	0.64N
Return force	0.049N
■Micro switch (manufactured by PANASONIC)	
Model	ABJ241661
■Receptacle (manufactured by HIROSE)	
Model	HR10A—7R—4P

■**Wiring diagram**



LED
COM
NO
NC
(1) (+)
(4)
24V
(2) (−)
(3)
Connector

Example

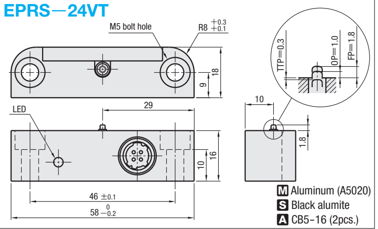


EGS—ANGLE
(P.1003)

CABLES FOR EJECTOR PLATE RETURN DETECTION SWITCH

The switch position is 29mm from right end. Please make sure before ordering.

EPRS—24VT



M5 bolt hole
R8 +0.3 +0.1
9
18
TTP=0.3
OP=1.0
FP=1.8
LED
29
10
16
10
1.8
46 ±0.1
58 0 −0.2

M Aluminum (A5020)
S Black alumite
A CB5-16 (2pcs.)

Part Number	U/Price 1～9
EPRS—24VT	Quotation

☎ Order

Part Number
EPRS—24VT

Days to Ship: Quotation

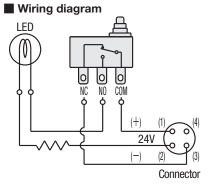
P Price: Quotation

■**Features**
- Easy to mount. The ejector plate return detection switch can be mounted by pocket added on the movable mold plate, which does not require complicated wiring process.
- Reduces time for mold replacement. The connector can be removed by only pulling the connecting sleeve. (one-touch function)
- LED turns red when the ejector plate returns.
- Ensures damage-free structure at the time of transfer/maintenance as the switch does not fall out of the mold.

■**Notes**
- To prevent damage, do not overstroke the micro-switches.

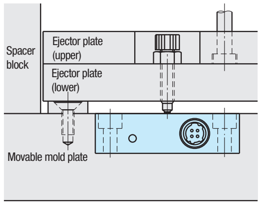
■EPRS—24VT		
Rated voltage		DC24V 1A
Circumferential temperature to be used		−40～85℃
Force needed to start		0.75N
Return force		0.10N
Free position	FP	1.8mm
Operation point	OP	1.0±0.2mm
Operating point limit	TTP	−0.3mm
■Micro switch (manufactured by OMRON)		
Model		D2HW—BR201H
■Receptacle (manufactured by HIROSE)		
Model		HR10A—7R—4P

■ **Wiring diagram**



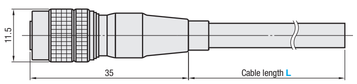
LED
NC
NO
COM
(+)
(1)
(4)
24V
(−)
(2)
(3)
Connector

Example



Spacer block
Ejector plate (upper)
Ejector plate (lower)
Movable mold plate

RoHS **EPRSC**



11.5
35
Cable length L

Part Number	L 100mm increments	U/Price 1～9
EPRSC	500～8000	Quotation

☎ Order

Part Number	—	L
EPRSC	—	3000

Days to Ship: Quotation

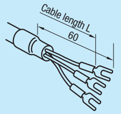
P Price: Quotation

■**Features**
- Reduces time for mold replacement. The connector can be removed by only pulling the connecting sleeve. (one-touch function)
- Oil-resistant/heat-resistant/flexible material is used for the cable, which has passed flame-resistant tests of UL/VW-1/C-UL/FT1.

■**Notes**
- EPRSC is the cable exclusively used for The ejector plate return detection switch (EPRS-24VT). Do not use it for other purposes.
- The number of the core of the connector is 4. However, 3-conductor cable is used.

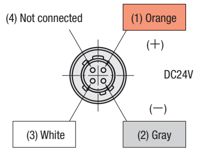
Alterations ☎

Part Number	—	L	—	(FC3)
EPRSC	—	3000	—	FC3

Alteration	Code	Spec.	1Code
	FC3	Fit the Y-shaped crimping terminal to the cable.	Quotation

Cable length L
60

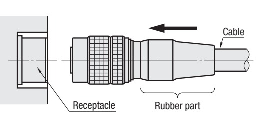
■**Connection wiring diagram (a view from the connector joint)**



(4) Not connected
(1) Orange
(+)
DC24V
(−)
(3) White
(2) Gray

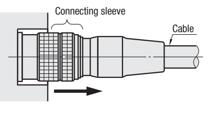
■Connector (manufactured by HIROSE)	
Model	HR10A—7P—4S
■Cable	
Model	UL2464TA
AWG size	24
No. of core	3
Outer diameter of core	1.15mm
Temperature to be used	0～80℃
Outer diameter	4.4mm

■ **How to attach/detach the connector**



Cable
Receptacle
Rubber part

Hold the rubber and align it with the guide of the receptacle and plug it in.



Connecting sleeve
Cable

Hold the connecting sleeve of the connector, and pull it out.

EJECTOR PLATE RETURN DETECTION SWITCHES

— Enduring type —

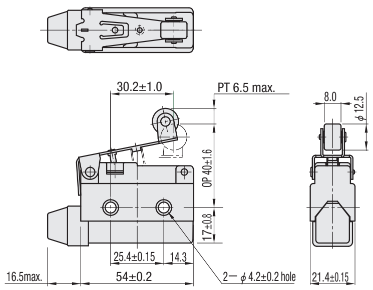
Non JIS material definition is listed on P.1351 - 1352

①

②

③

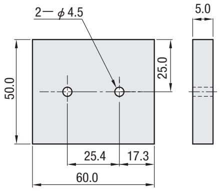
①EGSM—S (Microswitch: Roller・Short lever)



30.2±1.0
PT 6.5 max.
8.0
ϕ12.5
OP 40±1.6
17±0.8
25.4±0.15
14.3
16.5max.
54±0.2
2−ϕ4.2±0.2 hole
21.4±0.15

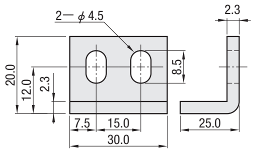
＊The rubber attached to the switch is for protection.

③EGS—D (Heat insulation plate)



2−ϕ4.5
5.0
50.0
25.0
25.4
17.3
60.0

②EGSM—L (L-angle plate)



2−ϕ4.5
2.3
20.0
12.0
2.3
8.5
7.5
15.0
30.0
25.0

Force needed to start (OF) : 240gf
Return force (RF) : 80gf
Movement till starting (PT) : 6.5mm
Movement after starting (OT) : 2.0mm
Differential motion (MD) : 1.5mm
Operation point (OP) : 40.0±1.6mm

Load Voltage	Resistance Load	Induction Load	Motor or Light Bulb Load	
			Normally-closed	Normally-opened
AC125V	10A	6A	3A	1.5A
AC250V	10A	4A	1.5A	1A
DC115V	10A	0.05A	—	—

Circumferential temperature to be used: −20℃～+60℃

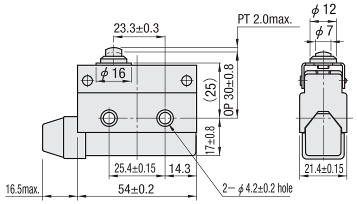
② **M** SPCC
③ **M** Bakelite (black)

④

⑤

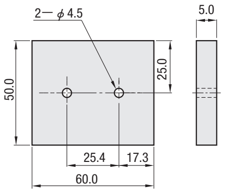
③

④EGSP—S (Microswitch:Short pushing・Plunger)



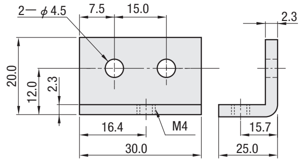
23.3±0.3
PT 2.0max.
ϕ12
ϕ7
ϕ16
(25)
OP 30±0.8
17±0.8
25.4±0.15
14.3
16.5max.
54±0.2
2−ϕ4.2±0.2 hole
21.4±0.15

③ EGS—D (Heat insulation plate)



2−ϕ4.5
5.0
50.0
25.0
25.4
17.3
60.0

⑤EGSP—L (L-angle plate)



2−ϕ4.5
7.5
15.0
2.3
20.0
12.0
2.3
16.4
M4
30.0
15.7
25.0

Force needed to start (OF) : 600gf
Return force (RF) : 100gf
Movement till starting (PT) : 2.0mm
Movement after starting (OT) : 0.8mm
Differential motion (MD) : 0.8mm
Operation point (OP) : 30.0±0.8mm

Load Voltage	Resistance Load	Induction Load	Motor or Light Bulb Load	
			Normally-closed	Normally-opened
AC125V	10A	6A	3A	1.5A
AC250V	10A	4A	1.5A	1A
DC115V	10A	0.05A	—	—

Circumferential temperature to be used: −20℃～+60℃

⑤ **M** SPCC
A CB4-20 (1 pc.) M4 nut (2 pcs.)
⑥ **M** Bakelite (black)

No.		Part Number	U/Price	
			1～9	10～19
Set of	①+②+③	EGSM (incl. 2 pcs. of CB4-35)	Quotation	
Set of	④+⑤+③	EGSP (incl. 2 pcs. of CB4-35)		
Switch	①	EGSM—S		
L-angle plate	②	EGSM—L		
Heat insulation plate	③	EGS—D		
Switch	④	EGSP—S		
L-angle plate	⑤	EGSP—L		

CB4-35 is included only in the set products.

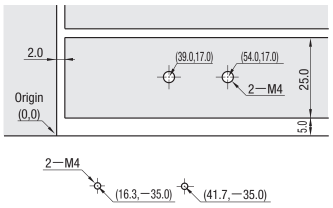
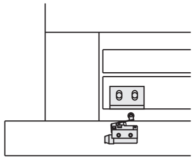
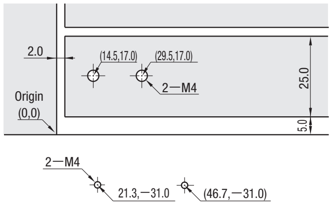
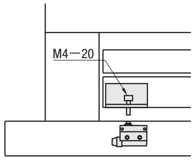
Order	Part Number
	EGSM EGSM—S

Days to Ship	Quotation

Example

- **Examples of bolt hole boring on a mold base**

Note: Following diagram is an example of bolt hole boring. Adjust with the size of bold base.

Bolt hole boring examples	Switch mounting examples	
EGSM  2.0 Origin (0,0) (39.0,17.0) (54.0,17.0) 2−M4 25.0 5.0 2−M4 (16.3,−35.0) (41.7,−35.0)	**EGSM** 	
EGSP  2.0 Origin (0,0) (14.5,17.0) (29.5,17.0) 2−M4 25.0 5.0 2−M4 21.3,−31.0 (46.7,−31.0)	**EGSP** 	・Adjust contact point to the switch by changing bolt position

Note: Compared with conventional switches for detection of returning ejector plate (EGS and EGS-V in P.1003), EGSM-S and EGSP-S are excellent in endurance as the switch casing is covered by reinforced plastic.

Note: Switch casing is also superior in dust proof and oil resistant as the casing is tightly closed with compressed rubber ring and diaphragm

Note: Indications for mechanical lifetime as 10 million operations or more (open/close frequency; 50 times / minute), electrical lifetime (resistance load) as 200 thousands operations or more (open/close frequency; 20 times / minute)

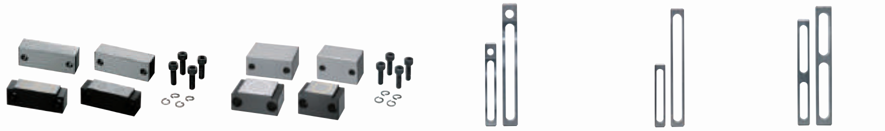
MOLD OPENING CONTROLLERS

MOLD OPENING CONTROLLERS

Product Name Part Number	Stop Bolts STBG	Urethane Washers UW	Puller Bolts—Female Screw Type— PBTN	—Male Screw Enhanced Type— PBTK	—Male Screw Type— PBTX	Puller Bolt Collars PBC
Page	1017	1018	1019	1020	1020	1020

Puller Bolts —Male screw tip short type Tip short reinforced type— PBTKS PBTXS	Actuator Rods For PartingLock PLRD	Parting Locks PL PLB PLP	Parting Locks—Heat-Resistant · Anti-Wear Type— PLH PLHB PLHP	Parting Lock Bushings PLBS	—PL Installation Type— PLBSP
1021	1022	1023	1024	1025	1026

Parting Lock Sets PL□ PL□—□□ PRS□ PRK□ PRL□	—Compact Type— PLSW PLSW—□□ PR□W	Parting Lock Sets—Mold Opening · Mold Closing Control Type— PL□Z PR□Z	Roller Lock Sets MPLK MPLKS MPLKB MPLKSB	—Heat Proof Standard Type/Heat Proof Long Type— MPLKH MPLKHS
1029	1030	1031	1033	1033

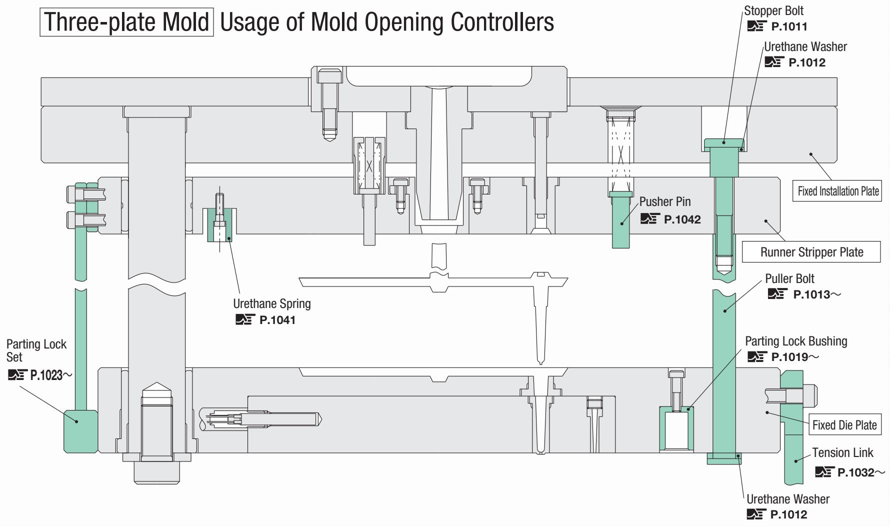


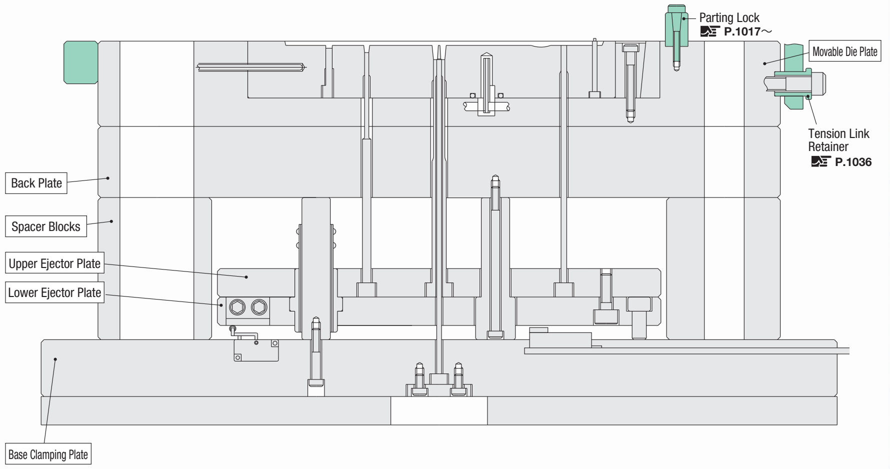
Magnet Lock Sets MLK	—Compact Type— MLKC	Tension Links—One End Fixed Stepped Type— TL TLH	—Long Stroke Type— TLK TLKH	—Adjustable Stroke Type— TLW TLWH
1035	1035	1038	1039	1040

—Stroke Designation Type— TLD TLDH	Special Bolts For Tension Link LKB LKBH	Tension Link Retainers LKR LKRB LKRH LKRBH LKT LKTB	Tension Chain Holders TCHH	Tension Chains TCHE JNTC
1041	1042 1042	1042	1043	1044

Mold Opening Prevention Plates—Standard Type— OPP—C OPPH—C OPPS	—L Dimension Designation Type— OPPF OPPSF	Mold Opening Prevention Plates—Cut-Out L Dimension Designation Type— DPPFN	Urethane Springs MAZ	Pusher Pins PSP
1045	1046	1047	1047	1048

Three-plate Mold Usage of Mold Opening Controllers


Stopper Bolt
P.1011
Urethane Washer
P.1012
Fixed Installation Plate
Pusher Pin
P.1042
Runner Stripper Plate
Puller Bolt
P.1013~
Urethane Spring
P.1041
Parting Lock Set
P.1023~
Parting Lock Bushing
P.1019~
Fixed Die Plate
Tension Link
P.1032~
Urethane Washer
P.1012

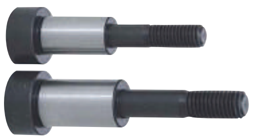

Parting Lock
P.1017~
Movable Die Plate
Tension Link Retainer
P.1036
Back Plate
Spacer Blocks
Upper Ejector Plate
Lower Ejector Plate
Base Clamping Plate

STOP BOLTS／URETHANE WASHERS

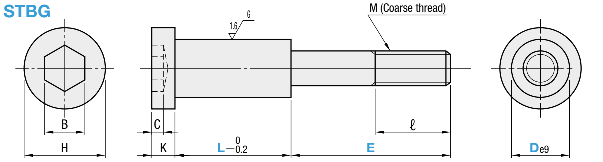
Non JIS material definition is listed on P.1351 - 1352

■Stop Bolts

RoHS



STBG



M SCM435
H 33～38HRC

C	K	H	B	M	ℓ	Part Number Type	Part Number D	L	E						U/Price 1～9
4	8	16	6	6	17	STBG	10	10	19	24					Quotation
								15	19	24	29				
								20	19	24	29	34			
4	8	18	8	8	20		13	10	22	27					
								15	22	27	32	37			
								20	22	27	32	37	42		
								25		27	32	37	42		
								30		27	32	37	42	47	
								35				37	42	47	
7	13	24	10	10	23		16	10	30	35					
								15	30	35	40				
								20	30	35	40	45			
								25	30	35	40	45	50		
								30		35	40	45	50	55	
								35				45	50	55	
9	13	27	14	12	26		20	15	38	43					
								20	38	43	48				
								25	38	43	48	53			
								30			48	53	58		
								35			48	53	58		
								45				53	58		
10	18	33	17	16	32		25	15	44	49					
								20		49	54	59			
								25		49	54	59			
								30		49	54	59	64		
								40			54	59	64	69	
10	18	40	17	20	38		30	25	55	60	65				
								30	55	60	65	70			
								40		60	65	70	80		
								50		60	65	70	80		

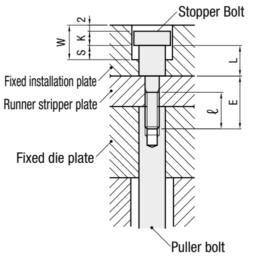
Order

Part Number	—	L	—	E
STBG16	—	20	—	30

Price Quotation

Days to Ship Quotation

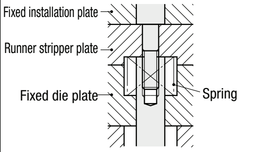
Example



- Shaft diameters D for stopper bolts STBG and puller bolts PBTN (☞ **P.1013**) are identical and can be used in combination.
  When using a D20 stopper bolt, use it together with a D20 puller bolt.

- The stopper bolts are designed to sink 2mm from the surface of fixed installation plates listed in the right table.
  Therefore, the relationship between the counterbore depth (W) and stroke (S) is:
  W＝S＋(Stopper bolt's head thickness K)＋2

  L＝(Fixed installation plate thickness)－(Stopper bolt's head thickness K＋2)



- When a runner stripper plate thickness in the following table is used, screw length ℓ for the stopper bolt is designed to fit into the puller bolt in a length of 1.5 times longer than the screw diameter.
  In this state, the stopper bolt's thread has an 8mm part not fit into the puller bolt so that a counterbore can be created on the runner stripper plate to house a spring.

  E＝(Stopper bolt M diameter)×1.5＋(Runner stripper thickness)

■Stopper Bolt Selections

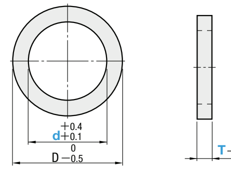
- Using the table below, select the appropriate stopper bolt size in accordance with the thickness of the fixed installation plate and runner stripper plate to be used.

Stopper bolts D	Fixed installation plate thickness	L	Runner stripper plate thickness 10	15	20	25	30	35	40	50
			E							
10	20	10	19	24	—	—	—	—	—	—
	25	15	19	24	29	—	—	—	—	—
	30	20	19	24	29	34	—	—	—	—
13	20	10	22	27	—	—	—	—	—	—
	25	15	22	27	32	37	—	—	—	—
	30	20	22	27	32	37	42	—	—	—
	35	25	—	27	32	37	42	—	—	—
	40	30	—	27	32	37	42	47	—	—
	45	35	—	—	—	37	42	47	—	—
16	25	10	—	30	35	—	—	—	—	—
	30	15	—	30	35	40	—	—	—	—
	35	20	—	30	35	40	45	—	—	—
	40	25	—	30	35	40	45	50	—	—
	45	30	—	—	35	40	45	50	55	—
	50	35	—	—	—	—	45	50	55	—
20	30	15	—	—	38	43	—	—	—	—
	35	20	—	—	38	43	48	—	—	—
	40	25	—	—	38	43	48	53	—	—
	45	30	—	—	—	—	48	53	58	—
	50	35	—	—	—	—	48	53	58	—
	60	45	—	—	—	—	—	53	58	—
25	35	15	—	—	44	49	—	—	—	—
	40	20	—	—	—	49	54	59	—	—
	45	25	—	—	—	49	54	59	—	—
	50	30	—	—	—	49	54	59	64	—
	60	40	—	—	—	—	54	59	64	69
30	45	25	—	—	—	55	60	65	—	—
	50	30	—	—	—	55	60	65	70	—
	60	40	—	—	—	—	60	65	70	80
	70	50	—	—	—	—	60	65	70	80

■Urethane Washers

RoHS

UW



Although urethane itself has a heat resistant temperature of 100˚C, when used continuously its durability falls, so use it at a temperature of no more than 80˚C.

H ShoreD58

D	d	Part Number Type	Part Number d	T	U/Price for 1～19 T1.5	T3
16	10	UW	10	1.5 3	Quotation	
18	13		13			
24	16		16			
27	20		20			

■Urethane hardness characteristics comparison (comparison with Shore A95)

Characteristic	Unit	ShoreD58	ShoreA95
Tensile strength	MPa	47.8	39.2
Elongation	%	440	400
Tensile Breakage Strength	kgf/cm	153	107
Impact Resilience	%	53	40
Compression set	%	39	45
Heat resistant temperature	℃	100	80

The above value is the reference value. It is not a guarantee value.

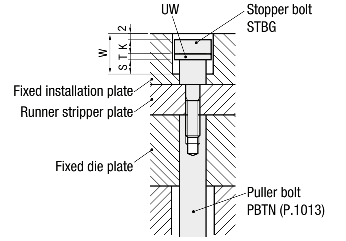
Order

Part Number	—	T
UW10	—	1.5

Days to Ship Quotation

Price Quotation

Example Use for soundproofing when the mold is being opened.



- When using a urethane washer on the stopper bolt, be careful of the forming dimension of the counterbore depth (W) for securing the stroke (S).

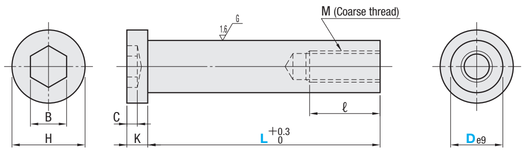
- The dimension of the stopper bolt is set so that the head is recessed 2 mm below the mounting plate. (See "Stopper Bolt STBG" on P.1011.)
  When using a urethane washer, the relationship between the counterbore depth (W) and the stroke (S) is〔W＝S＋urethane washer thickness T＋stopper bolt head thickness K＋2〕.

PULLER BOLTS

—FEMALE SCREW TYPE—

RoHS

PBTN



M SCM435
H 33～38HRC

C	K	H	B	M	ℓ	Part Number Type	D	L	U/Price 1～9
4	8	16	6	6	17	PBTN	10	40 50 60 70	Quotation
								80 90	
								100 110 120	
								130 140 150	
								160 170 180	
4	8	18	8	8	20		13	60 70	
								80 90	
								100 110 120	
								130 140 150	
								160 170 180	
								190 200 210	
								220 230 240 250 260	
								280	
7	13	24	10	10	23		16	100 110 120	
								130 140 150	
								160 170 180	
								190 200 210	
								220 230 240 250 260	
								280 300	
9	13	27	14	12	26		20	120 130 140 150	
								160 170 180	
								190 200 210	
								220 230 240 250 260	
								280 300	
								350	
								400	
10	18	33	17	16	32		25	170 180	
								190 200	
								210 220	
								230 240	
								250 260	
								280 300	
								350	
								400	
10	18	40	17	20	38		30	200	
								250	
								300	
								350	
								400	

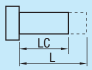
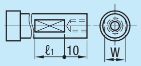
Order Part Number — L
PBTN13 — 110

Days to Ship Quotation

Price Quotation

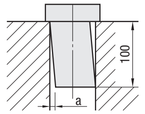
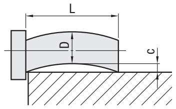
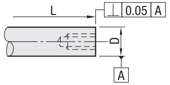
Alterations ☎ Part Number — L (LC) — (SC)
PBTN20 — LC205

Days to Ship: Quotation

Alterations	Code	Spec.	1Code
	LC	L dimension alteration D / LC 10 / 35～175 13 / 55～275 16 / 95～295 20 / 115～395 25 / 165～395 30 / 205～395 5mm increments	Quotation
 Available when D≧13	SC	Spanner groove alteration D / W / ℓ1 13 / 11 / 20 16 / 14 20 / 18 25 / 23 30 / 28	

To control mold opening stroke by means of puller bolts alone, make sure to use puller bolt collars designed specially for them.

■Precision Standard for Puller Bolts

Reference item	Overview	Allowable range
Squareness of the shank part		Squareness of the head's internal plane against the vertical direction of shaft D. a≦0.05 per 100mm
Warpage of the shank part		Warpage of shaft D in L direction referring to the head's internal plane c≦0.04 per 100mm
D dimension and precision of end face		D and squareness of the end face 0.05 or less D and coaxiality of the tap 0.2 or less

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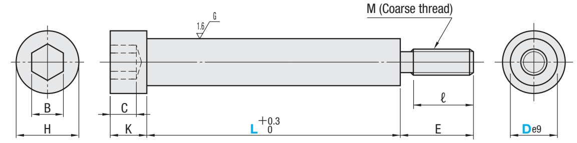
PULLER BOLTS

—MALE SCREW TYPE (Enhanced)—

Non JIS material definition is listed on P.1351 - 1352

RoHS

PBTK (Male Screw Enhanced Type)
PBTX (Male Screw Type)



M SCM435
H 33～38HRC

C	K PBTK	K PBTX	H	B	E	M PBTK	M PBTX	ℓ (Reference)	Part Number Type	D	L	U/Price for 1～9 PBTK	U/Price for 1～9 PBTX
4	8	8	16	6	19	M 8	M 6	17	PBTK (Male Screw Enhanced Type) PBTX (Male Screw Type)	10	100 110 120	Quotation	
											130 140 150		
4	10	8	18	8	22	M10	M 8	20		13	100 110 120		
											130 140 150		
											160 170 180		
											190 200		
											210 220 230 240 260		
7	14	13	24	10	30	M12	M10	23		16	100 110 120		
											130 140 150		
											160 170 180		
											190 200		
											210 220 230 240 260		
9	18	13	27	14	38	M16	M12	26		20	140 150		
											160 170 180		
											190 200		
											210 220 230 240 250 260		
											280 300		
10	19	18	33	17	44	M20	M16	32		25	170 180		
											190 200		
											210 220		
											230 240		
											250 260		
											280 300		
											320		
											350		

PBTK • PBTX cannot be used in combination with PBTN.

Order Part Number — L
PBTK20 — 160

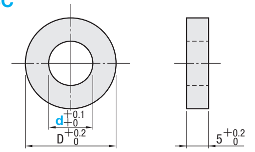
Price Quotation

Days to Ship Quotation

■Puller Bolt Collars

RoHS

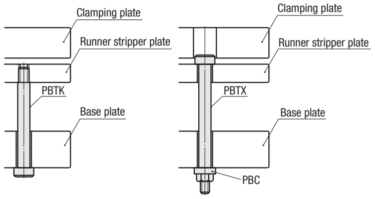
PBC



M S45C
H 34～43HRC
A Spring washers (JIS B1251—2)

D	d	Applicable puller bolt dia.	Part Number Type	Part Number d	U/Price 1～9
15	6	10	PBC	6	Quotation
18	8	13		8	
21	10	16		10	
25	12	20		12	
30	16	25		16	

Example



Order Part Number
PBC8

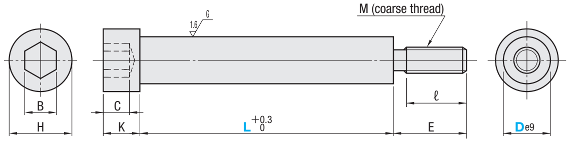
Days to Ship Quotation

Price Quotation

PULLER BOLTS

—MALE SCREW TIP SHORT TYPE・TIP SHORT REINFORCED TYPE—

PBTKS (Tip short・reinforced type)
PBTXS (Tip short type)



6
1.6
M (coarse thread)
ℓ
B
H
C
K
L +0.3 0
E
De9

M SCM435
H 33～38HRC

C	K		H	B	E		M		ℓ(Reference)		Part Number		L	U/Price 1～9	
	PBTKS	PBTXS			PBTKS	PBTXS	PBTKS	PBTXS	PBTKS	PBTXS	Type	D		PBTKS	PBTXS
4	8		16	6	15		M8	M6	12	12.5	PBTKS (Tip short・reinforced type) PBTXS (Tip short type)	10	100 110 120	Quotation	
													130 140 150		
4	10	8	18	8	19		M10	M8	15	16		13	100 110 120		
													130 140 150		
													160 170 180		
													190 200		
7	14	13	24	10	24	21	M12	M10	19	17		16	120		
													130 140 150		
													160 170 180		
													190 200		
													210 220 230 240		
9	18	13	27	14	29	24	M16	M12	24	19		20	140 150		
													160 170 180		
													190 200		
													210 220		
10	19	18	33	17	34	30	M20	M16	28.5	24.5		25	170 180		
													200		
													220		
													240		
													260		

Order	Part Number	—	L
	PBTKS13	—	150

Price Quotation

Days to Ship Quotation

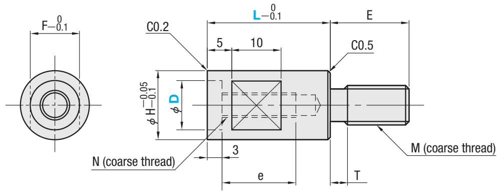
■Characteristics

- Shorter male screw can prevent male screw from protruding from the plate.
- PBTXS can be used together with female screw type (PBTN).

ACTUATOR RODS FOR PARTING LOCK

Non JIS material definition is listed on P.1351 - 1352

PLRD



F 0 -0.1
C0.2
L 0 -0.1
E
5
10
C0.5
φH -0.05 -0.1
φD
3
N (coarse thread)
e
T
M (coarse thread)

M S45C
S Black Oxide

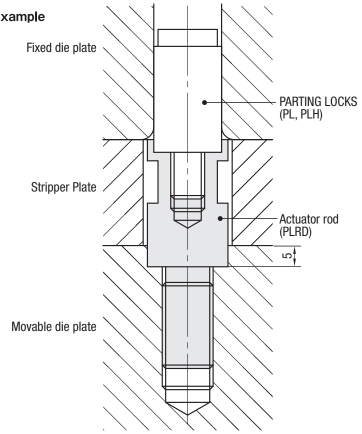
H	F	N	e	M	E	T (Reference)	Part Number		L					
							Type	D						
13	10	M5	12	M8	12	2	PLRD	10	25	30	35	40	45	—
16	12	M6	12	M10	15	2		13	25	30	35	40	45	—
19	14	M8	15	M12	18	3		16	—	30	35	40	45	50
23	19	M10	15	M16	20	3		20	—	30	35	40	45	50

Order	Part Number	—	L
	PLRD13	—	30

Price Quotation

Days to Ship Quotation

Example



Fixed die plate
PARTING LOCKS (PL, PLH)
Stripper Plate
Actuator rod (PLRD)
5
Movable die plate

■Characteristics

- When the stripper plate was used, resin sleeve type (PL and PLH) could not control mold opening, however, use of actuator rod can now be controlled with the resin sleeve type.

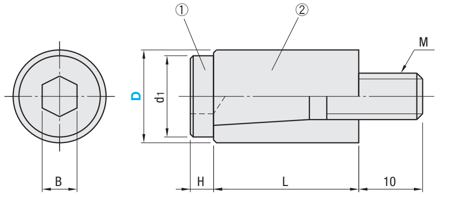
■Mounting

- To stabilize the actuator rod (PLRD), embed it to the movable die plate by at least 5mm.
- Adjust the actuator rod (PLRD) so that it does not come out of the stripper plate.
- The hole diameter of the stripper plate should be aimed at actuator rod (PLRD) external shape (H)+1mm.

PARTING LOCKS

RoHS
①Tapered Bolt
②Resin Sleeve
Set ①+②

PL



① M SCM435
② M High grade Nylon (PA66) Temperature to be used: up to 80˚C

d_1	M	B	L	H	Part Number		U/Price
					Type	D	1～19
8.5	5	4	18	3	**PL** (Set ①+②)	10	Quotation
11.5	6	5	20	3.2		13	
14	8	6	25	4		16	
18	10	6	30	4		20	

■Tapered Bolts for PL Parting Lock (Component)

Part Number		U/Price
Type	No.	1～19
PLB ① (Tapered bolt only)	10	Quotation
	13	
	16	
	20	

■Resin Sleeves for PL Parting Lock (Component)

Part Number		U/Price
Type	D	1～19
PLP ② (Resin sleeve only)	10	Quotation
	13	
	16	
	20	

Order

Part Number	
①+②Set	PL13
①Tapered bolt only	PLB13
②Resin sleeve only	PLP13

Days to Ship Quotation

Price Quotation

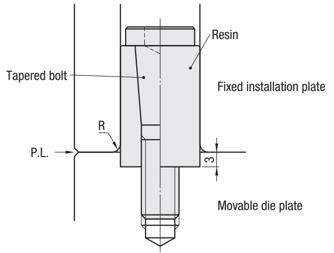
■ Features

- Allows adjustment of friction between the base plate and resin sleeve by tightening/loosening the tapered bolt.
- Made of a high grade nylon (PA66), this parting lock features excellent corrosion and heat resistance properties. The resin sleeve by itself has heat resistant temperature of 150˚C. But use it at 80˚C or less because the durability will reduce due to tightening stress by the tapered bolt in the practically continuous use.

■How to Mount

- Embed the resin sleeve about 3mm in the movable side die plate.
- Create a hole on the fixed side die plate and finish it so that its internal surface roughness finishes within the range between $\overset{1.6}{\bigtriangledown}\sim\overset{0.2}{\bigtriangledown}$.
  Also make sure to R-chamfer the inlet edge-the parting lock's durability becomes lower with a C-chamfered edge.
- As to the hole's dimensional tolerance, aim at creating a H7 reamer hole for PL10, and a H7 reamer hole +0.1 for PL13/16/20.
- These R-chamfering and surface polishing processes can be omitted by using a PLBS bushing that is specially designed for use with this parting lock.
- The required tension can be obtained by adjusting (tightening/loosening)the lock's tapered bolt.

! Do not lubricate this parting lock. Lubrication reduces its friction force and nullifies its function.



●Typical usage of parting locks

Part Number	No. of parting locks	Mold weight
PL10	4 pcs.	100kg or less
PL13	4 pcs.	250kg or less
PL16	4 pcs.	250kg or more
PL20	4 pcs.	300kg or more

! Use the above values as reference only. Applicable mold weight and suitable number of parting locks depend on the precision and finishing of a counterpart hole, as well as the level of bolt tightening.

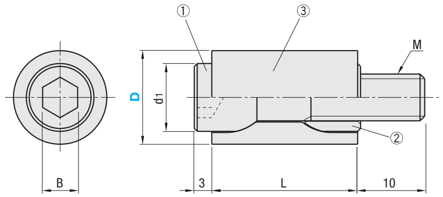
PARTING LOCKS

—Heat-Resistant120˚C • ANTI-WEAR TYPE—

! Non JIS material definition is listed on P.1351 - 1352

RoHS
①Special Bolt
Set ①+②+③
③Resin Sleeves
②Ring

PLH



① M SCM435
② M S45C
③ M Special resin Temperature to be used: up to 120˚C

d_1	M	B	L	Part Number		U/Price
				Type	D	1～19
7.6	5	4	17	**PLH** (Set ①+②+③)	10	Quotation
9.6	6	5	20		13	
11.6	8	6	25		16	
14.6	10	6	30		20	

■①Special Bolt+②Ring for PLH Parting Lock

Part Number		U/Price
Type	No.	1～19
PLHB ①+② (Special Bolt + Ring)	10	Quotation
	13	
	16	
	20	

■Resin Sleeves for PLH Parting Lock (Component)

Part Number		U/Price
Type	D	1～19
PLHP ③ (Resin Sleeves only)	10	Quotation
	13	
	16	
	20	

Order

Part Number	
①+②+③Set	PLH13
①+②Special Bolt+Ring	PLHB13
③Resin Sleeves only	PLHP13

Days to Ship Quotation

Price Quotation

■Features

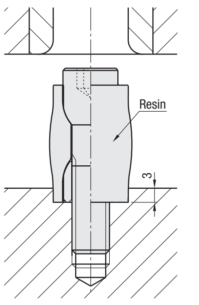
Heat resistance	···Compared with conventional products (PL) whose resin sleeves have heatproof temperature of 80˚C, PLH can be used under temperature up to 120˚C.
Wear resistance	···Because even force is applied in vertical direction through special bolt and ring, the center of resin sleeve is smoothly expanded, thus reducing the generation of abrasion powder.
Interchangeability	···PLH can be replaced with molds for which conventional products are used.
Typical usage	···The number of parting locks and mold weight for each size are equal to those of conventional products.

■ How to mount

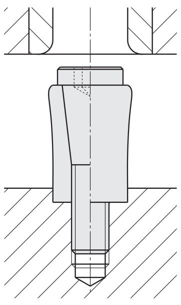
- Same as conventional products.
  (Refer to **P.1017** for detail.)

■ Notes

- PLH is of 3-piece structure.
  Mount PLH so that the special bolt protrudes from the resin sleeve as shown in the figure.
  (Pin gate mark is on the bottom surface.)
- In terms of shape characteristics, the bolt tightening torque is lower than that of conventional products, so keep the once tightening amount within 1/4 turn during operation.



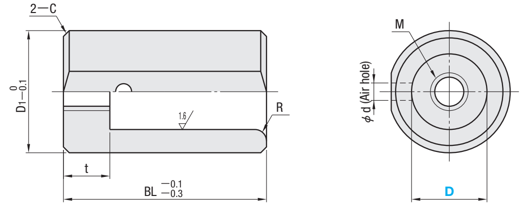
Heat resistance • Wear resisrance type
Parting Locks (PLH)



Conventional products (PL)

PARTING LOCK BUSHINGS

RoHS **PLBS**



M S45C
S Black Oxide

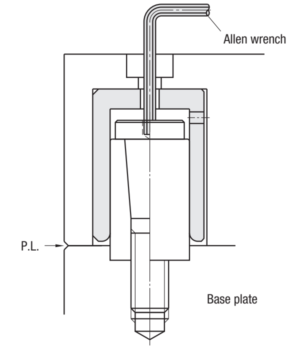
D1	BL	t	R	d	C	M	Part Number		U/Price
							Type	D	1∼19
16	26	6	2	2.3	0.8	6	**PLBS** (Bushing For PL)	10	Quotation
20	30	8	2.5	2.8	1.0	8		13	
25	37	10	3	3	1.0	10		16	
30	42	10	3	3	1.0	10		20	

Order **Part Number** PLBS13 Days to Ship **Quotation**

Price **Quotation**

■Features

- By using PLBS, polishing and R-chamfering of the hole at PL installation can be omitted.
- Enables tightening/loosening of the PLBS parting lock's tapered bolt by using an Allen wrench (hexagonal wrench) through its bottom tap hole, making installation adjustment and maintenance easier than ever.

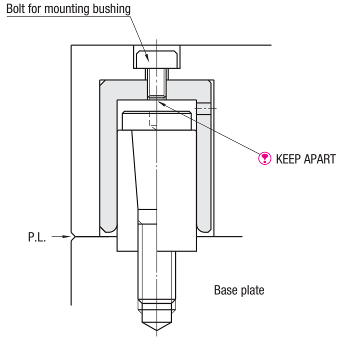


■How to Mount

- When creating and finishing a hole for this bushing, aim at $D_1{}^{+0.1}_{+0.05}$ tolerance for its diameter. (The depth of hole is a level of BL $^{+0.5}_{+0.1}$.)
- Recommended finishing on the bushing's diameter (D_1) is end milling.

■Note

- Please use a bushing mounting bolt with a length which does not reach PLB during mold closing.
  Tapered bolt might be damaged by the contact of the bushing mounting bolt.
  Be especially careful because even slight contact damages the hole of tapered bolt for hexagonal wrench, and the removal becomes impossible.

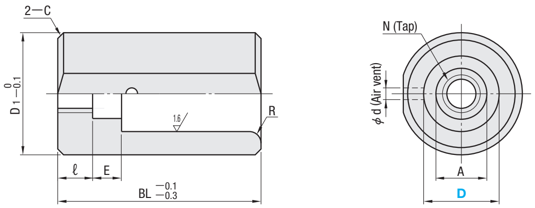


PARTING LOCK BUSHINGS

—PL INSTALLATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS **PLBSP**



M S45C
S Black Oxide

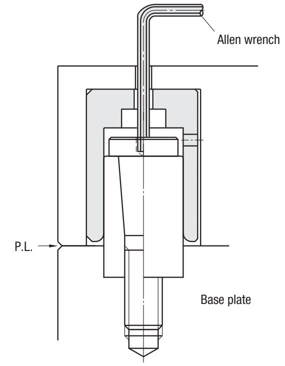
D1	BL	ℓ	E	R	d	C	A	N Tap for pulling out	Mounting bolt size	Part Number		U/Price
										Type	D	1∼19
16	32	6	6	2	2.3	0.8	10	M6	M5	**PLBSP**	10	Quotation
20	37	8	7	2.5	2.8	1	11	M8	M6		13	
25	46	10	9	3	3	1	14	M10	M8		16	
30	51	10	9	3	3	1	14	M10	M8		20	

Order **Part Number** PLBSP20 Days to Ship **Quotation**

Price **Quotation**

■Features

- By using PLBSP, polishing and R-chamfering of the hole at PL installation can be omitted.
- The bushing mounting bolt can be mounted and removed from PL side, making maintenance easier.
- Damage due to contact between the bushing mounting bolt and the tapered bolt (PLB) is prevented.

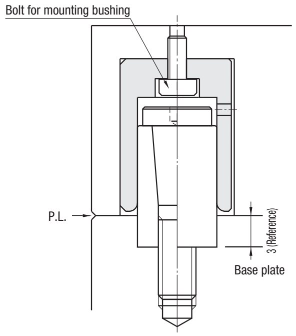


■How to Mount

- When creating and finishing a hole for this bushing, aim at $D_1{}^{+0.1}_{+0.05}$ tolerance for its diameter. (The depth of hole is a level of BL $^{+0.5}_{+0.1}$)
- Recommended finishing on the bushing's diameter (D_1) is end milling.

■Note

- When using PLBSP10, the diameter of counterbore for the bushing mounting bolt (A size) is the same as D size, so the resin sleeve (PLP) must be embedded approx. 3mm into the die plate so that the bushing mounting bolt's head does not come into contact with PLB (tapered bolt).



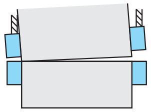
PARTING LOCK SETS
—GUIDE—

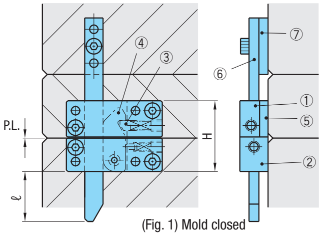
■Features

1. Compact and easy to mount.
2. Enables accurate mold opening movement with no reaction.
3. Can also be used for low-pressure molding as it imposes little load when locking.
4. Functions regardless of the order of mold closing processes.
5. Makes the slide lock retreat if the runner stripper side closes before the parting line.

■Notes

1. Always use more than two sets on a mold.
2. Use this parting lock set within the following load limits:
   - PLS/PLSW···1 ton or less per mold (when 2 sets are used)
   - PLM···1.8 tons or less per mold (when 2 sets are used)
   - PLL···4 tons or less per mold (when 2 sets are used)
3. Maintain proper alignment of the right and left release points to avoid uneven contact and resultant breakage.

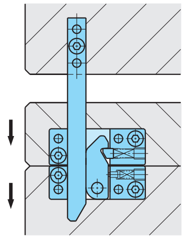




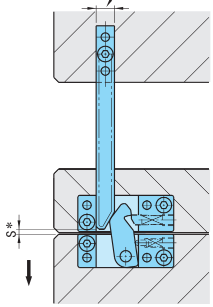
(Fig. 1) Mold closed

No.	H
PLS	50
PLM	68
PLL	86

The release bar's sliding face has been reinforced up to 45HRC or higher through induction hardening. However, strength of its side faces has been kept under 30HRC for drilling of mounting holes.



(Fig. 2) Mold opened

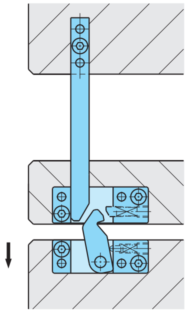


(Fig. 3) Release point of the cam lock

The release point is where the release bar's end comes above the Smm* cam holder's top surface.

* Use the S values shown in the table as reference only. Make sure to check the actual release timing on the site.

No.	S*(mm)
PLS	Approx. 2
PLM	Approx.11
PLL	Approx.15



(Fig.4) Parting Line is released

METHOD OF INSTALLING THE PARTING LOCK SET/EXAMPLE OF PLSW OPERATION
(PLS/PLM/PLL)

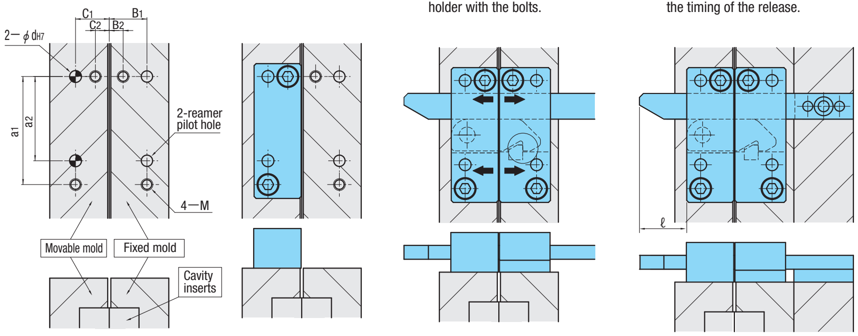
■ Method of installing the parting lock

① Form bolt holes and reamer holes in the mold parallel to the PL face to a pitch accuracy of within ±0.01. If the pitch accuracy is within ±0.02, form the holes to the reamer pilot hole dimension. (Machine the holes while taking into consideration the clearance between the insert and the mold.)

② Install the cam holder on the movable mold.

③ In order to eliminate looseness between the cam lock and the slide lock, insert the release bar, temporarily fix the slide holder while pulling it parallel to the cam holder, ream the holes and press-fit the dowel pins. In this condition, confirm that the release bar operates smoothly, and then tighten the slide holder with the bolts.

④ Install the die in the molding machine, cut the release bar to the necessary length, form the bolt holes and reamer pilot holes, temporarily fix the release bar, check the sliding operation of the parting lock, and then ream the holes and press-fit the dowel pins. Make the overhang length ℓ of each release bar the same in order to equalize the timing of the release.



	a_1	a_2	C_1	C_2	B_1	B_2	M	d_{H7}	Reamer pilot hole M−0.3
PLS	54.5	42.5	17	7	19	7	M 6	6	ϕ5.7
PLM	70	55	21	9	29	9	M 8	8	ϕ7.7
PLL	82	66	27	11	37	11	M10	10	ϕ9.7

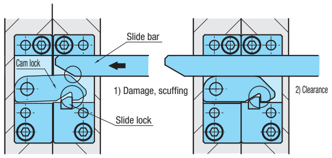
Precautions

If you form the dowel pin hole of the parting lock set by NC machining, the following trouble will occur.

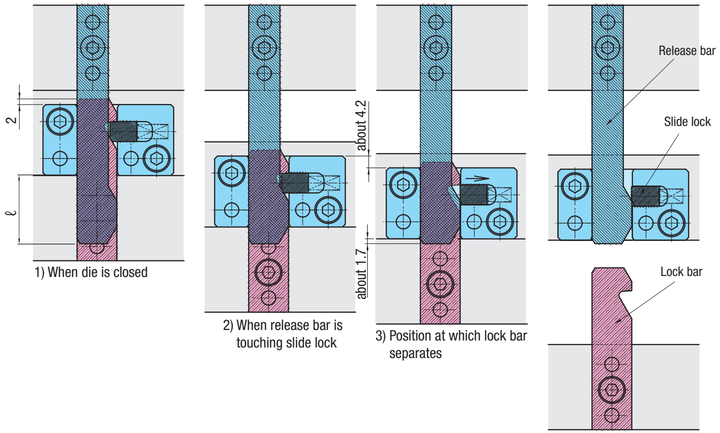
1) The positions of the cam lock and slide lock will become misaligned, making it difficult to insert the slide bar. This in turn may result in damage to the cam lock or other part.

2) A clearance will occur between the cam lock and the slide lock, resulting in defective molding.

For the above reasons, carry out position adjustment by matching with the actual part.



■Example of PLSW operation



1) When die is closed

2) When release bar is touching slide lock

3) Position at which lock bar separates

4) PL in open condition

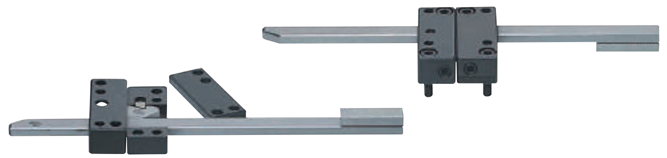
■ How to Mount

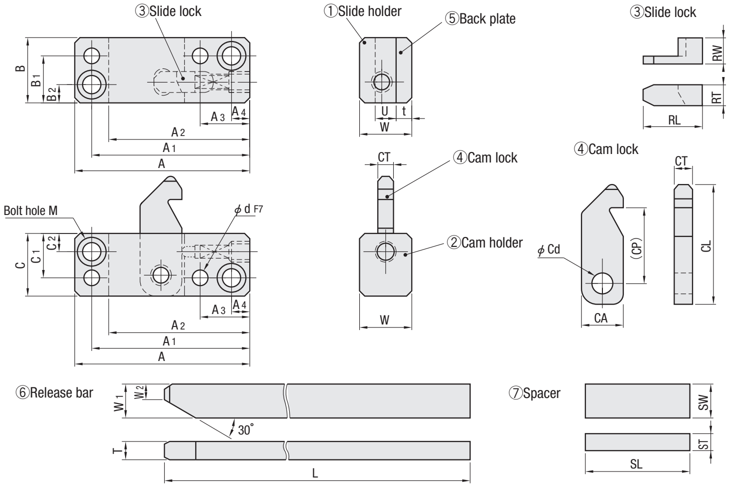
1) Form bolt holes and reamer holes using NC machining, and install the cam holder parallel to the PL face.
2) Cut the cam lock to the necessary length, form the bolt holes and reamer pilot holes, tighten the cam lock with the bolts while pulling it, carry out position adjustment by matching with the actual part, form the dowel holes, and fix the cam lock.
3) Cut the release bar to the necessary length, and install it perpendicular to the mold. Make the overhang length ℓ of each release bar the same in order to equalize the release points.

PARTING LOCK SETS

—FOR LIGHT・MEDIUM・HEAVY LOAD—

RoHS





③Slide lock
①Slide holder
⑤Back plate
③Slide lock
B
B1
B2
A3
A4
A2
A1
A
U
t
W
RW
RT
RL
CT
④Cam lock
④Cam lock
CT
②Cam holder
Bolt hole M
φd F7
C
C1
C2
A3
A4
A2
A1
A
W
φCd
(CP)
CL
CA
⑥Release bar
W1
W2
30°
T
L
⑦Spacer
SW
ST
SL

Item	①Slide holder	②Cam holder	③Slide lock	④Cam lock	⑤Back plate	⑥Release bar	⑦Spacer
M	SKD61	SKD61	SKD11	SKD11	SK	S45C	S45C
H	50～55HRC	50～55HRC	58HRC～	58HRC～	50HRC～	45HRC～ (Induction hardening)	—

Part Number	①Slide holder・②Cam holder															③Slide lock		
	A	A_1	A_2	A_3	A_4	B	B_1	B_2	C	C_1	C_2	W	U	Bolt hole M	d	RL	RT	RW
PLS	68	61.5	55	19	7	26	19	7	24	17	7	20	8	For M6	φ 6	18	7	11
PLM	88	79	70	24	9	38	29	9	30	21	9	30	12	For M8	φ 8	20	9	16
PLL	104	93	82	27	11	48	37	11	38	27	11	45	20	For M10	φ 10	24	12	26

④Cam lock					⑤	⑥Release bar				⑦Spacer			Accessories			Part Number	U/Price (①～⑦ 1～9 sets)
CL	CP	CA	CT	Cd	t	W_1	W_2	T	L	SW	ST	SL	Bolt 4 pcs.	Dowel pin 4 pcs.	Spring 2 pcs.		
45	28	16	7.5	8	6	13	5.9	7	250	13	6.5	40	CB6—25	MSTM6—30	WHH6—15	PLS	Quotation
64	41	20	10	10	7	16	8	10	300	16	8	50	CB8—35	MSTM8—40	WHH8—20	PLM	
84	53.5	25	18	13	8	20	9.5	15.5	350	20	10.2	55	CB10—50	MSTM10—50	WHH8—20	PLL	

■Components (Unit) Use when a cam holder unit is necessary, such as during two-color molding or insert molding, or when a lock set with a long release bar is necessary.

Part Number	①③⑤＋Accessories Slide holder unit	U/Price for 1～9 sets	②④＋Accessories Cam holder unit	U/Price for 1～9 sets	⑥(L: 300mm)⑦ Release bar long type	U/Price for 1～9 sets
For PLS	PLS—SH	Quotation	PLS—CH	Quotation	PLS—RL	Quotation
For PLM	PLM—SH		PLM—CH		—	

When PLS with a long release bar is necessary, use PLS-SH, PLS-CH and PLS-RL.

■Components (Single Items) Consumable components-cam locks, slide locks and release bars can be purchased independently.

Part Number	③Slide lock only	U/Price for 1～9	④Cam lock only	U/Price for 1～9	⑥Release bar only	U/Price for 1～9
For PLS	PRS		PRK		PRL	
For PLM	PRSM		PRKM		PRLM	
For PLL	PRSL	Quotation	PRKL	Quotation	PRLL	Quotation

Order

Part Number
PLM

Days to Ship **Quotation**

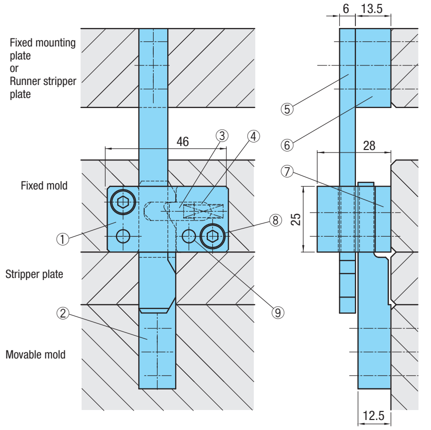
Price **Quotation**

PARTING LOCK SETS

—COMPACT TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

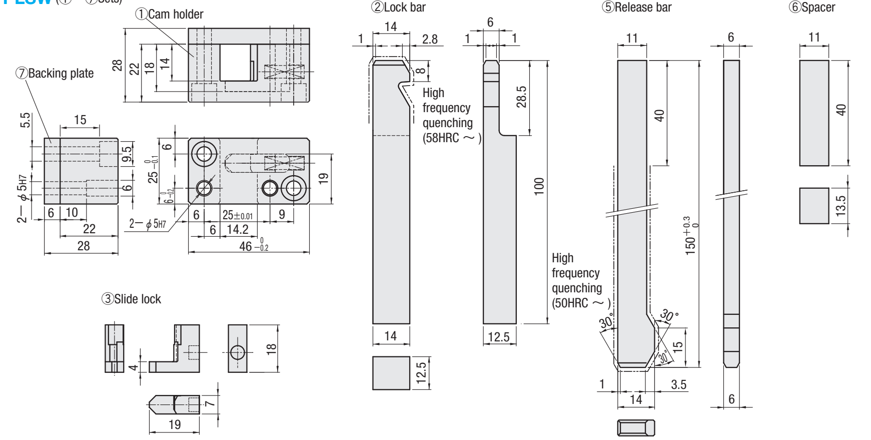


6
13.5
Fixed mounting plate or Runner stripper plate
⑤
⑥
46
③
④
28
⑦
Fixed mold
⑧
25
①
Stripper plate
②
⑨
Movable mold
12.5

Items	M	H
①Cam holder	SKD61	50～55HRC
②Lock bar	SKS3	58HRC～ (High frequency quenching)
③Slide lock	SKD11	58～60HRC
④Spring	SUS631	—
⑤Release bar	SKS3	50HRC～ (High frequency quenching)
⑥Spacer	S45C	—
⑦Backing plate	SKS3	50HRC～

A: ⑧ CB5—30 (2Pcs.) ⑨ MSTM5—25 (2Pcs.)

PLSW (①～⑦Sets)



①Cam holder
⑦Backing plate
28
22
18
14
5.5
15
2—φ5H7
9.5
6
25
6
10
22
28
2—φ5H7
6
25±0.01
14.2
46
9
19
③Slide lock
4
18
7
19
②Lock bar
14
1
2.8
8
High frequency quenching (58HRC～)
6
1
1
28.5
100
14
12.5
12.5
⑤Release bar
11
40
150
High frequency quenching (50HRC～)
30°
30°
15
1
14
3.5
6
6
⑥Spacer
11
40
13.5
6

■Parting Lock Set

Components	Part Number	U/Price 1～9 Sets
①～⑦ Sets	PLSW	Quotation

Order

Part Number
PLSW

■ Cam holder unit

Components	Part Number	U/Price 1～9 Sets
①③④⑦＋Accessories	PLSW—CH	Quotation

■ Release bar long type

Components	Part Number	U/Price 1～9 Sets
⑤(Length: 250mm)⑥	PLSW—RL	Quotation

If a lock set with long release bar is necessary, use PLSW-CH, PLSW-RL and PRKW.

■Components (Single Items)

Components	Part Number	U/Price 1～9
②Lock bar	PRKW	
③Slide lock	PRSW	Quotation
⑤Release bar	PRLW	

Consumable components-lock bars, slide locks and release bars can be purchased independently.

Days to Ship **Quotation**

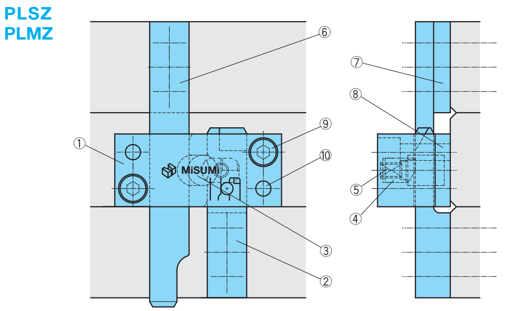
Price **Quotation**

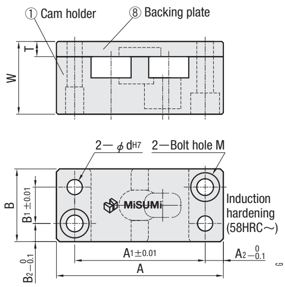
■Features

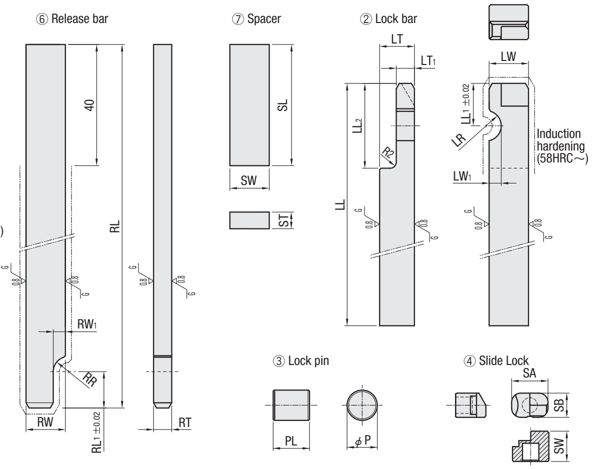
- Space saving······The lock bar and release bar are constructed in such a way that they overlap when operating, thus realizing compactness (width is 46 mm).
- The lock bar is included, so it can also be used for thrusting out the stripper plate.

PARTING LOCK SETS

—MOLD OPENING・MOLD CLOSING CONTROL TYPE—


PLSZ
PLMZ
⑥
⑦
⑧
⑨
⑩
①
⑤
④
③
②
MiSUMi


① Cam holder
⑧ Backing plate
W
T
2—ϕdH7
2—Bolt hole M
B
B1±0.01
B2 0/−0.1
A1±0.01
A
A2 0/−0.1
MiSUMi
Induction hardening (58HRC～)


⑥ Release bar
40
RL
RW1
RR
RW
RL1±0.02
RT
⑦ Spacer
SL
SW
ST
② Lock bar
LT
LT1
LL2
R2
LL
LL1±0.02
LR
LW
LW1
Induction hardening (58HRC～)
③ Lock pin
PL
ϕP
④ Slide Lock
SA
SB
SW

No.	Name	M	H
①	Cam holder	Alloy tool steel	50～55HRC
②	Lock bar		58HRC～
③	Lock pin		58～60HRC
④	Slide Lock		58～60HRC
⑤	Spring	SUS631	
⑥	Release bar	Alloy tool steel	58HRC～
⑦	Spacer	S45C	
⑧	Backing plate	Alloy tool steel	50HRC～
⑨	Socket head cap screw	SCM435	38～43HRC
⑩	Dowel pin	SUJ2	45～50HRC

Part number	① Cam holder ⑧ Backing plate										② Lock bar							
	A	A1	A2	B	B1	B2	d	M	W	T	LW	LW1	LR	LL	LL1	LL2	LT	LT1
PLSZ	55	43	6	24	12	6	5	5	24	5	13	4	5	100	14	28	11.5	6
PLMZ	67	53	7	32	16	8	6	6	32.5	6	18	5	6	150	18	36	16.5	10

③ Lock pin		④ Slide lock			⑤ Spring	⑥ Release bar						⑦ Spacer			Accessories	
P	PL	SA	SB	SW		RW	RW1	RR	RL	RL1	RT	SW	SL	ST	⑨ Bolt	⑩ Dowel pin
10	12	12	8	10	WLH5—15	13	4	5	150	12	6	13	40	5.5	CB5—25	MSTM5—30
12	17	16	10	13	WLH6—20	16	5	6	200	16	10	16	50	6.6	CB6—35	MSTM6—35

■**Set**

Components	Part number	U/Price 1～9 Set
①～⑩ Set	PLSZ	Quotation
	PLMZ	

■**Components (Single Items)**

Components	Part Number	U/Price 1～9
②Lock bar	PRKZ	Quotation
	PRKZM	
④Slide lock	PRSZ	
	PRSZM	
⑥Release bar	PRLZ	
	PRLZM	

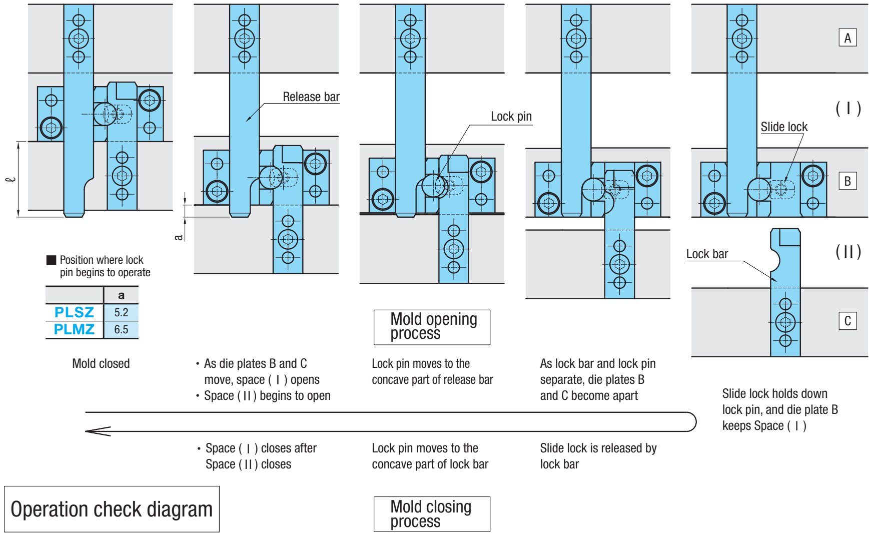
☎	Order	Part Number PLSZ
	Days to Ship	Quotation
P	Price	Quotation

HOW TO START／MOUNT PARTING LOCK SET

Non JIS material definition is listed on P.1351 - 1352

■Characteristics

- Mold closing control (closing PL surface after closing the stripper plate, etc.), which was not possible with the conventional parting lock set (PLS and PLSW), is now possible.
- The lock bar is long, so it can also be used for thrusting out the stripper plate.
- Enables accurate mold opening and closing movement with no reaction.


ℓ
a
Release bar
Lock pin
Slide lock
Lock bar
A
B
C
(I)
(II)
Mold opening process
Mold closing process
Operation check diagram

■ Position where lock pin begins to operate

	a
PLSZ	5.2
PLMZ	6.5

Mold closed

- As die plates B and C move, space (I) opens
- Space (II) begins to open

Lock pin moves to the concave part of release bar

As lock bar and lock pin separate, die plates B and C become apart

Slide lock holds down lock pin, and die plate B keeps Space (I)

- Space (I) closes after Space (II) closes

Lock pin moves to the concave part of lock bar

Slide lock is released by lock bar

■Mounting

(1)Mount 2 or more parting lock sets at symmetrical positions of the mold.

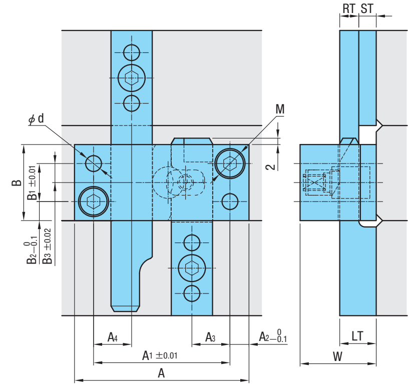
PLSZ : 10KN or less for 1 mold/when mounting 2 sets

PLMZ : 20KN or less for 1 mold/when mounting 2 sets

(2)Form bolt holes and reamer holes using NC machining, and install the cam holder parallel to the PL face.

(3)Cut the lock bar to the necessary length, form the bolt holes and reamer pilot holes, tighten the cam lock with the bolts while pulling it, carry out position adjustment by matching with the actual part, form the dowel holes, and fix the cam lock.

(4)Cut the release bar to the necessary length, and install it perpendicularly to the mold. Make the overhang length ℓ of each release bar the same in order to equalize the release points. (Maintain proper alignment of the release points to avoid uneven contact and resultant breakage.)


RT
ST
ϕd
M
2
B
B1±0.01
B2 0/−0.1
B3±0.02
A4
A3
A2 0/−0.1
A1±0.01
A
LT
W

Part Number	A	A1	A2	A3	A4	B	B1	B2	B3	W	LT	RT	ST	d	M
PLSZ	55	43	6	12	12	24	12	6	6	24	11.5	6	5.5	5	5
PLMZ	67	53	7	15	14	32	16	8	8	32.5	16.5	10	6.5	6	6

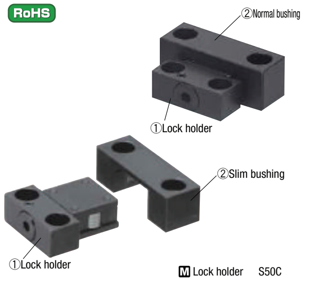
ROLLER LOCK SETS (NORMAL BUSHINGS/SLIM BUSHINGS)

—STANDARD TYPE/LONG TYPE/HEAT PROOF STANDARD TYPE/HEAT PROOF LONG TYPE—

Non JIS material definition is listed on P.1351 - 1352

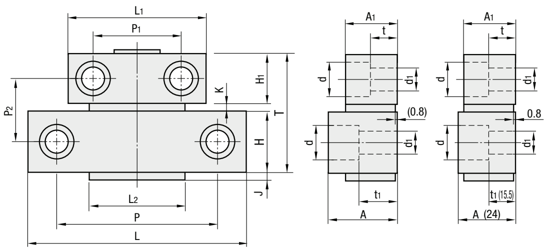
Standard Type/Heat Proof Standard Type

RoHS


②Normal bushing
①Lock holder
②Slim bushing
①Lock holder

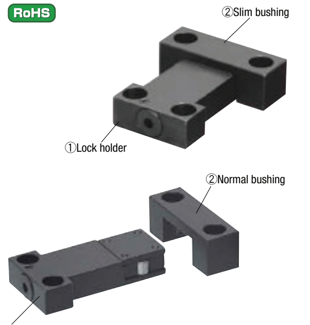
M Lock holder S50C
Lock bushing SK3

Type		Usage temperature
Normal bushing	Slim bushing	
MPLK	**MPLKS**	Use under temperature 80˚C
MPLKH	**MPLKHS**	Use under temperature 150°C or lower (heat proof)


(Normal bushing)
(Slim bushing)
L1
P1
P2
K
H1
T
H
J
L2
P
L
A1
t
d
d1
(0.8)
0.8
t1
A
t1 (15.5)
A (24)

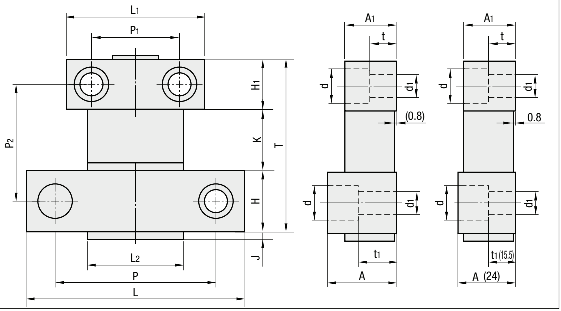
Long Type/Heat Proof Long Type

RoHS

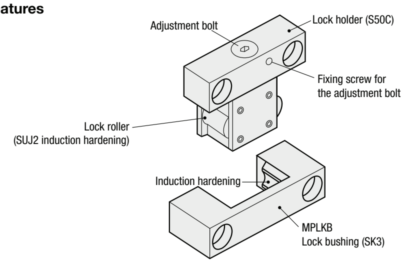

②Slim bushing
①Lock holder
②Normal bushing
①Lock holder

M Lock holder S50C
Lock bushing SK3

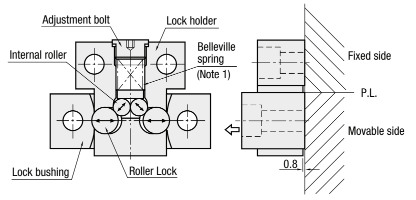
Type		Usage temperature
Normal bushing	Slim bushing	
MPLK	**MPLKS**	Use under temperature 80˚C
MPLKH	**MPLKHS**	Use under temperature 150°C or lower (heat proof)


(Normal bushing)
(Slim bushing)
L1
P1
H1
P2
K
T
H
J
L2
P
L
A1
t
d
d1
(0.8)
0.8
t1
A
t1 (15.5)
A (24)

■Features


Adjustment bolt
Lock holder (S50C)
Fixing screw for the adjustment bolt
Lock roller (SUJ2 induction hardening)
Induction hardening
MPLKB
Lock bushing (SK3)

■Structure and Usage


Adjustment bolt
Lock holder
Internal roller
Belleville spring (Note 1)
Fixed side
P.L.
Movable side
Lock bushing
Roller Lock
0.8

(Note 1) Coil spring for MPLK10.

- Mount it in parallel to the parting line.
- The roller lock set can be removed by pulling it in the direction of arrow in the figure.

Roller Lock Set Features

- Enables well-balanced mold opening/closing through its mechanism composed of a belleville spring, internal rollers and lock rollers.
- Its rollers prevent uneven wear.
- The lock bushing's vertically symmetrical design allows a worn piece to be reused by reinstalling it in reverse.
- The lock holder's back recess enables it to be used even on a stepped mold plates.
- For heat proof type, the adjusting bolt differs from standard type for identification.
  (Standard type: black oxide Heat proof type: Trivalent Chromate)

Load Adjustment and Load Characteristics

- Opening/closing load can be adjusted using an Allen wrench. The load is maximum when the adjustment bolt is fully tightened, 50% when it is loosened a half rotation, 0 when it is loosened 1 rotation or more. ※ For MPLK10, the load decreases about 25% when the adjustment bolt is loosened a half rotation, 70% when it is loosened one rotation.
- The load for mold closing is about 50% of mold opening.
- A fixing screw is provided on the load adjustment bolt.
  Loosen it to perform load adjustment, and make sure to tighten it after adjustment is completed.

Note: Make sure to assemble the right and left units symmetrically for well balanced operation.

■Standard Type・Heat Proof Standard Type (①+② sets)

Part Number		Max. usable load (2 sets under normal temp)	L	L1	L2	T	H	H1	J	K	P	P1	P2	A	A1	t	t1	d	d1	**A** 2 pcs. each	U/Price for 1~9 sets	
Type	No.																				MPLK・MPLKS	MPLKH・MPLKHS
(Normal bushing) **MPLK**	**10**	981N {100kgf}	48	36	25	42	22	18	2	2	36	24	22	24	16	9.5	18	11	6.5	CB6—20 CB6—30	Quotation	—
(Normal bushing) **MPLK** **MPLKH**	**20**	1961N {200kgf}	54	42							40	28				9	16			CB6—20 CB6—25		
	30	2942N {300kgf}	65	46	35	48.5	25	20	3.5	3.5	50	31	26	27	19	9.5	17		6.5	CB6—30 CB6—35		
	60	5884N {600kgf}	73	50							52	33						14	9	CB8—30 CB8—35		
	***80S**	7845N {800kgf}				56.5				11.5			34									
	100	9807N {1000kgf}	103	65	48	58	30	24	4	4	76	42	31	34	25	13	19	17	11	CB10—30 CB10—35		
(Slim bushing) **MPLKS** **MPLKHS**	**30**	2942N {300kgf}	65	46	35	48.5	25	20	3.5	3.5	50	31	26	24	19	9.5	15.5	11	7	CB6—25 CB6—30		
	60	5884N {600kgf}	73	50							52	33						14	9	CB8—25 CB8—30		
	***80S**	7845N {800kgf}				56.5				11.5			34									

∗T dimensions of MPLK80S and MPLKS80S are 56.5, and K dimensions of them are 11.5.

■Long Type・Heat Proof Long Type (①+② sets)

Part Number		Max. usable load (2 sets under normal temp)	L	L1	L2	T	H	H1	J	K	P	P1	P2	A	A1	t	t1	d	d1	**A** 2 pcs. each	U/Price for 1~9 sets	
Type	No.																				MPLK・MPLKS	MPLKH・MPLKHS
(Normal bushing) **MPLK** **MPLKH**	**60L**	5884N {600kgf}	73	50	35	79.5	25	20	3.5	34.5	52	33	57	27	19	9.5	17	14	9	CB8—30 CB8—35	Quotation	
	80	7845N {800kgf}				87.5				42.5			65									
	100L	9807N {1000kgf}	103	65	48	89	30	24	4	35	76	42	62	34	25	13	19	17	11	CB10—30 CB10—35		
(Slim bushing) **MPLKS** **MPLKHS**	**80**	7845N {800kgf}	73	50	35	87.5	25	20	3.5	42.5	52	33	65	24	19	9.5	15.5	14	9	CB8—25 CB8—30		

■Lock Bushing Component (② only) (Common with Heat Proof Type)

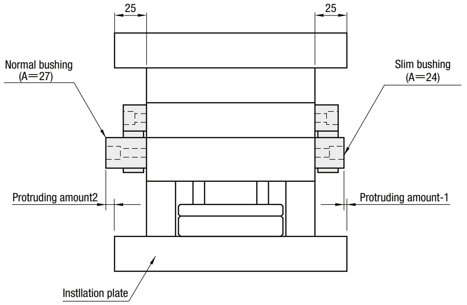
Part Number		Application	U/Price
Type	No.		1~9
MPLKB (Normal bushing)	**10**	For MPLK(H)10	Quotation
	20	For MPLK(H)20	
	30	For MPLK(H)30 For MPLK(H)S30	
	6080	For MPLK(H)60・80・60L・80S For MPLK(H)S60・80・80S	
	100	For MPLK(H)100・100L	

Part Number		Application	U/Price
Type	No.		1~9
MPLKSB (Slim bushing)	**30**	For MPLK(H) S30 For MPLK(H) 30	Quotation
	6080	For MPLK(H) 60・80・80S For MPLK(H) S60・80・80S	

※For use in 2-color molding, insert molding, etc. that require additional lock bushings.

Order	Part Number		
	MPLK60 **MPLKH80S** **MPLKS30** **MPLKB6080**	Days to Ship	Quotation
		Price	Quotation

■Comparison of Normal Bushing and Slim Bushing


25
25
Normal bushing (A=27)
Slim bushing (A=24)
Protruding amount2
Protruding amount-1
Instllation plate

About slim bushings

- For roller lock set slim bushings, the height of lock bushing (A dimension) is standardized as 24mm.The one side of molding base installation board is a standard corresponding to the amount of protrude 25mm.
- When mold is installed in the molding machine, the part where roller lock set protrudes interferes in the tie bar.
  It becomes the damage prevention of roller lock set and the tie bar. Moreover, there is no trouble in keeping and transporting.
- Although the heights of bushings (A→24, t1→15.5) become lower, the load and other dimensions remain the same as conventional products.

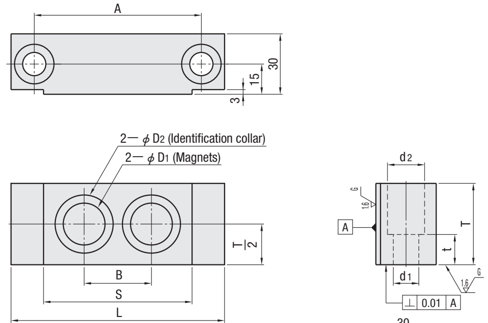
MAGNET LOCK SETS

—NORMAL TYPE・COMPACT TYPE—

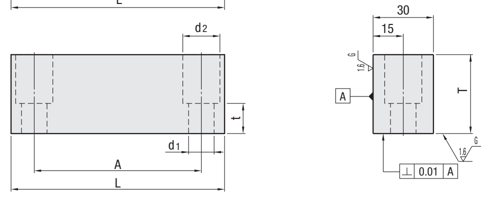
■Normal Type RoHS **MLK**

Ⓜ SS400
magnet MLK40・100 Neodymium magnet (Heat resistance: up to 80˚C)
MLK80・200 SmCo magnet (Rare earth) (Heat resistance: up to 200˚C)

■Holder



■Block

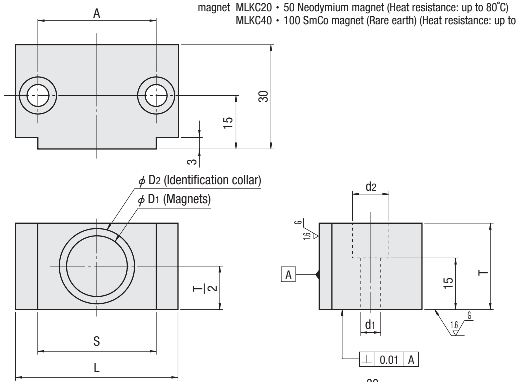


Ⓜ SS400

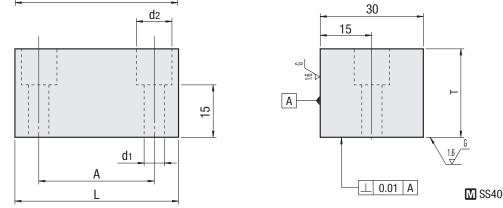
■Compact Type RoHS **MLKC**

Ⓜ SS400
magnet MLKC20・50 Neodymium magnet (Heat resistance: up to 80˚C)
MLKC40・100 SmCo magnet (Rare earth) (Heat resistance: up to 200˚C)

■Holder



■Block



Ⓜ SS400

Non JIS material definition is listed on P.1351 - 1352

■ Normal Type

Part Number	Adhesion strength (per set under 20˚C)	A	B	S	L	T	t	D1	D2	Identification collar	d1	d2	**A**	U/Price 1〜9
MLK 40	392.3N {40kgf}	63	25	60	80	25	12	18	22	Gold (Brass)	9	14	CB8−25 4pcs. Spring washers 4pcs.	Quotation
MLK 80	784.5N {80kgf}									Silver (Aluminum)				
MLK100	980.7N {100kgf}	100	39	79	126	40	15	30	34	Gold (Brass)	11	18	CB10−30 4pcs. Spring washers 4pcs.	
MLK200	1961.3N {200kgf}									Silver (Aluminum)				

Adhesion strength per set indicates the vertical force by which a holder and a block adhered each other can be separated.

■Features
- Is easier to install compared with other types of mold locking units.
- Requires little slowing down for mold closing. (making the molding cycle more efficient)

■ Compact Type

Part Number	Adhesion strength (per set under 20˚C)	A	S	L	T	D1	D2	Identification collar	d1	d2	**A**	U/Price 1〜9
MLKC 20	196.1N {20kgf}	36	36	50	25	17.5	22	Gold (Brass)	6.6	11	CB6−25 4pcs. Spring washers 4pcs.	Quotation
MLKC 40	392.2N {40kgf}							Silver (Aluminum)				
MLKC 50	490.3N {50kgf}	52	52	70	40	29.5	34	Gold (Brass)	9	14	CB8−30 4pcs. Spring washers 4pcs.	
MLKC100	980.6N {100kgf}							Silver (Aluminum)				

Adhesion strength per set indicates the vertical force by which a holder and a block adhered each other can be separated.

■Features
- MLKC40・100 is about 50%〜60% smaller than normal type (MLK).
- Is easier to install compared with other types of mold locking units.
- Requires little slowing down for mold closing. (making the molding cycle more efficient)

Order

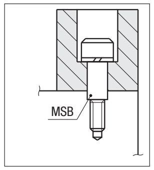
Part Number
MLK100
MLKC100

Price Quotation

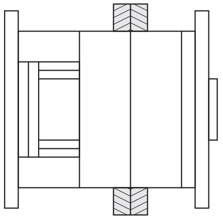
Days to Ship Quotation

■How to Mount

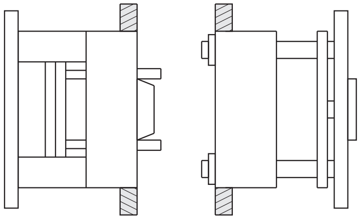
- Install the magnet lock sets with the mold closed.
  Place them onto the mold's center, and fasten with the supplied bolts.
- Install them so that the magnetic face is in parallel to the parting line.
- Finish the plate surfaces so that the lock's magnets tightly couple together.
- Use MSB Shoulder Bolts if bolt breakage is anticipated. **P.1192**
  To use a MSB Shoulder Bolt, make sure to create a counterbore on the plate.
  Finish the counterbore into H7 or so.



Example



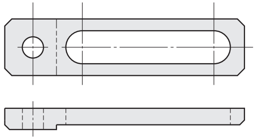
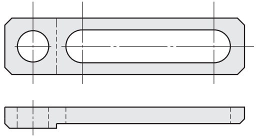
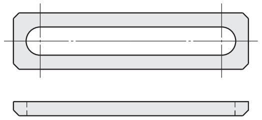
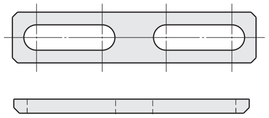
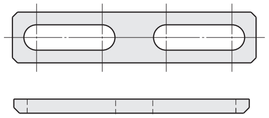
Mold closed



Mold opened

GUIDE FOR TENSION LINKS

■List of Tension Links

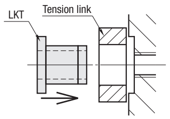
Shape / Thickness	Part Number 9mm type	Part Number 16mm type
Stepped type/Fixed side for socket head cap screws (CB) 	**TL** P.1032	–
Stepped type/Fixed side for special bolts・Retainers 	**TL** + Alteration BD P.1032	**TLH** P.1032
Long stroke type/Both sides for special bolts・Retainers 	**TLK** P.1033	**TLKH** P.1033
Stroke adjusting type/Both sides for special bolts・Retainers 	**TLW** P.1034	**TLWH** P.1034
Stroke designation type/Both sides for special bolts・Retainers 	**TLD** P.1035	**TLDH** P.1035

■Installation Parts

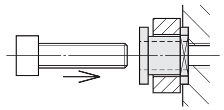
Part Number Fixed side	Part Number Movable side
CB (Socket Head Cap Screws) P.1185	**LKB／LKBH** (Special bolts) **LKR／LKRH** **LKT** (Special retainers) P.1036
LKB (Special bolts) **LKR** (Special retainers) P.1036	**LKB／LKBH** (Special bolts) **LKR／LKRH** **LKT** (Special retainers) P.1036
LKB／LKBH (Special bolts) **LKR／LKRH** **LKT** (Special retainers) P.1036	
LKB／LKBH (Special bolts) **LKR／LKRH** **LKT** (Special retainers) P.1036	
LKB／LKBH (Special bolts) **LKR／LKRH** **LKT** (Special retainers) P.1036	

■Special Retainer (LKT) Installation Method

① Insert the flat head side of LKT to fit into long hole width.



② LKT is fixed with a bolt after being turned 90˚.



●Features

When flat type tension link is used, head section of the retainer functions as a step of 1mm and mold can be opened and closed without having link and plate in contact.

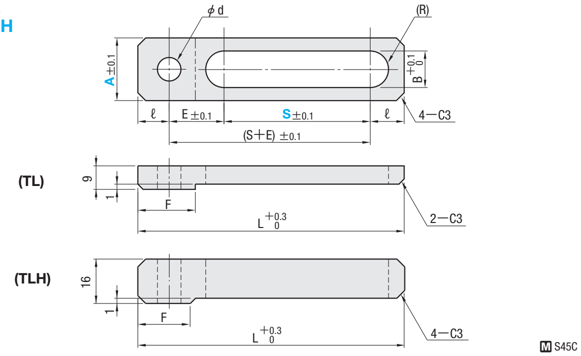
TENSION LINKS

—STEPPED TYPE—

Ⓣ Non JIS material definition is listed on P.1351 - 1352

RoHS

TL
TLH



B	F	E	ℓ	L	d	Part Number Type	A	S 5mm increments
11	19	16	14.5	S+45	6.5	TL	19	50～170
14	25	20	17	S+54	8.5		25	50～200
17	32	30	18.5	S+67	10.5		32	80～200
21	38	30	20.5	S+71	12.5		38	100～200
11	24	20	14.5	S+49	10.5	TLH	19	50～270
14	28	23	17	S+57	13.5		25	50～270
17	32	30	18.5	S+67	16.5		32	80～300
21	38	33	20.5	S+74	20.5		38	100～350

Price

■Quantity discount rate P.45

Quantity	1～9	10～19	20～49	50～100
Rate	–	5%	10%	15%

Ⓣ To be quoted on price & lead time above Max. Q'ty.

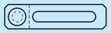
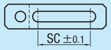
Order Quotation

Days to Ship Quotation

Alterations

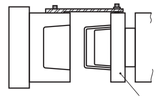
Part Number — (SC・BD)
TL25 — 120 — BD
TLH19 — SC116

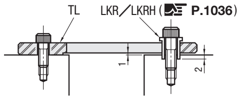
Quotation

Alterations	Code	Spec.	1Code
	BD	d dimension (for socket head cap screws) is revised for special bolt・retainer. Ⓣ Available for TL only. ⊗ Not available for A=19 Part Number / d: TL25 / 13.5 TL32 / 16.5 TL38 / 20.5	Quotation
	SC	SC=1mm increments Ⓣ Available for TLH only. Part Number / Ⓣ SC designation range: TLH19 / 50<SC<270 TLH25 / 50<SC<270 TLH32 / 80<SC<300 TLH38 / 100<SC<350	

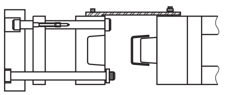
Example

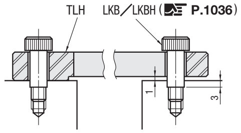
●Example of stripper plate type application





●Example of three-plate type application





■Example of Mounting TL

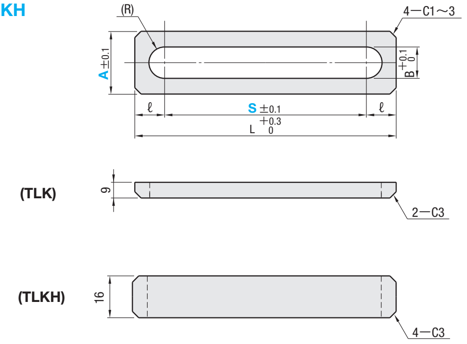
- Sliding parts of the tension links have 1mm clearance so that the mold can be opened and closed without coming in contact with the plate.
- In order to prevent bolt damage in plate on movable side, please use retainer LKR／LKRH special for tension links or bolt LKB／LKBH special for tension links. Use with counterbore of 2mm as shown.
  This protects the bolts from damage as the retainer takes place for them to receive impact load caused by the tension link upon mold opening.

■Example of Mounting TLH

- In order to prevent bolt damage in plate on fixed・movable side, please use retainer LKB／LKBH special for tension links.
- Create a 3mm counterbore on the plate as shown in the figure.
- The bolt's shaft receives impact load caused by the tension link, protecting the bolt itself from damage.

TENSION LINKS
—LONG STROKE TYPE—

RoHS **TLK**
TLKH



M S45C

B	ℓ	L	Part Number		S
			Type	A	5mm increments
11	14.5	S+29	TLK TLKH	19	50~230 (250)
14	17	S+34		25	50~270 (300)
17	18.5	S+37		32	80~350 (400)
21	20.5	S+41		38	100~400 (450)

The figures in ( ) are applicable for TLK only.

Order

Part Number	—	S
TLK25	—	100

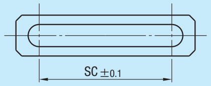
Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	(SC)
TLK25	—	SC97

Quotation

Alteration	Code	Spec.	1Code
SC±0.1	SC	SC=1mm increments	Quotation

Part Number	SC designation range
TLK/TLKH19	50<SC<230(250)
TLK/TLKH25	50<SC<270(300)
TLK/TLKH32	80<SC<350(400)
TLK/TLKH38	100<SC<400(450)

The figures in ( ) are applicable for TLK only.

Example

- Not being fixed on the plates with bolts, this tension link allows the mold to open and close as shown in Fig. 1 and 2. It enables to secure a longer stroke and to keep the mold height low.
- When special bolt LKB/LKBH, retainer LKR/LKRH, LKT for links are used in fixing tension links, accidents such as damage can be prevented.

LKB/LKBH, LKR/LKRH, LKT P.1036

- When special retainer (LKT) is used, head section of the retainer makes a 1mm clearance and mold can be opened and closed without having link and plate in contact.

Fig. 1 Mold closed

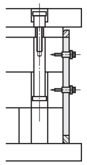
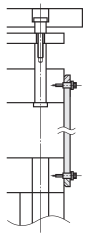
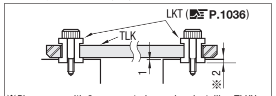


Fig. 2 Mold opened



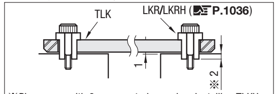
■Example of Mounting TLK・TLKH

●When special retainer (LKT)s used



※Please use with 3mm counterbore when installing TLKH.

●When special retainer (LKR/LKRH)s used

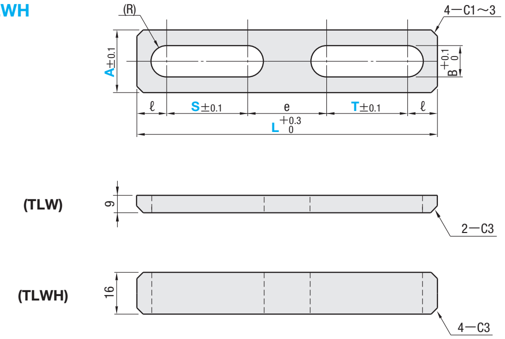


※Please use with 3mm counterbore when installing TLKH.

TENSION LINKS
—ADJUSTABLE STROKE TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS **TLW**
TLWH



M S45C

B	ℓ	Part Number		5mm increments			e min.
		Type	A	L	S	T	
11	15	TLW TLWH	19	100~320	15~130	40~140	25
14	17.5		25	115~335	15~135	40~140	25
17	18.5		32	140~385	25~140	50~180	28
21	20.5		38	150~410	25~150	50~185	34

L—2ℓ—S—T≧e min.

Order

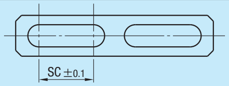
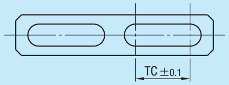
Part Number	—	L	—	S	—	T
TLWH25	—	260	—	S100	—	T100

Days to Ship **Quotation**

Price **Quotation**

Alterations

Part Number	—	L	—	(SC)	—	(TC)
TLWH 25	—	260	—	SC98	—	TC96

Alterations	Code	Spec.	1Code
SC±0.1	SC	SC=1mm increments L—2ℓ—SC—T(TC)≧e min. e min. changes to the value shown in the table at right.	Quotation
TC±0.1	TC	TC=1mm increments L—2ℓ—S(SC)—TC≧e min. e min. changes to the value shown in the table at right.	

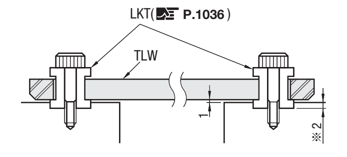
A	e min.	SC designation range
19	22	15<SC<130
25	25	15<SC<135
32	28	25<SC<140
38	34	25<SC<150

A	e min.	TC designation range
19	22	40<TC<140
25	25	40<TC<140
32	28	50<TC<180
38	34	50<TC<185

Example

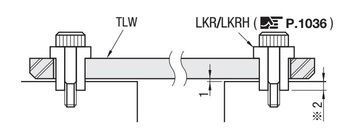
■Example of Mounting TLW・TLWH

● When special retainer (LKT) is used



※Please use with 3mm counterbore when installing TLWH.

● When special retainer (LKR/LKRH) is used



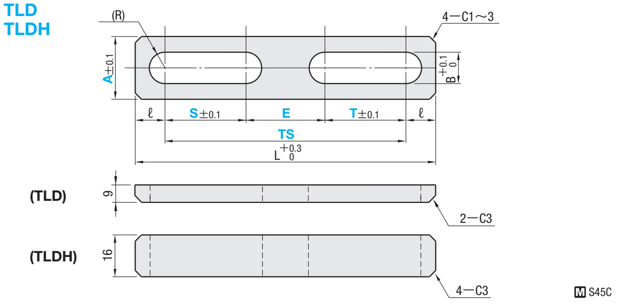
※Please use with 3mm counterbore when installing TLWH.

TENSION LINKS

—STROKE DESIGNATION TYPE—

RoHS

TLD
TLDH



M S45C

B	ℓ	L	Part Number		5mm increments			
			Type	A	S	E	T	TS (S+E+T)
11	15	TS+30	TLD TLDH	19	15~130	25~235	40~140	80~290
14	17.5	TS+35		25	15~135	25~245	40~140	80~300
17	17.5	TS+35		32	25~140	25~275	50~180	105~350
21	20	TS+40		38	25~150	30~295	50~185	115~375

Please specify TS by the same figure as the total of S+E+T.

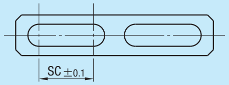
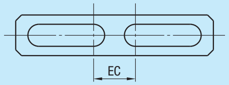
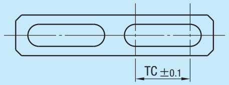
Part Number	— S	— E	— T	— TS
TLD 25	— S60	— E100	— T100	— TS260

Quotation

Price Quotation

Alterations

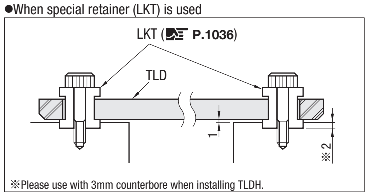
Part Number	— (SC)	— (EC)	— (TC)	— (TS)
TLD25	— SC98	— EC42	— TC102	— TS242

Alterations	Code	Spec.	1Code
	SC	SC=1mm increments A / SC designation range 19 / 15<SC<130 25 / 15<SC<135 32 / 25<SC<140 38 / 25<SC<150	Quotation
	EC	EC=1mm increments A / EC designation range 19 / 25<EC<235 25 / 25<EC<245 32 / 25<EC<275 38 / 30<EC<295	
	TC	TC=1mm increments A / TC designation range 19 / 40<TC<140 25 / 40<TC<140 32 / 50<TC<180 38 / 50<TC<185	

Example

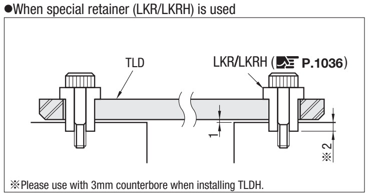
■**Example of Mounting TLD・TLDH**

●When special retainer (LKT) is used



※Please use with 3mm counterbore when installing TLDH.

●When special retainer (LKR/LKRH) is used



※Please use with 3mm counterbore when installing TLDH.

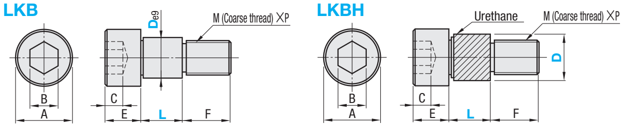
SPECIAL BOLTS FOR TENSION LINK/TENSION LINK RETAINERS

—STANDARD TYPE/URETHANE TYPE—

Non JIS material definition is listed on P.1351 - 1352

■**Special Bolts for Tension Link** RoHS

LKB **LKBH**



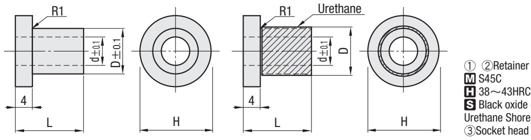
M SCM435
H 33~38HRC
S Black oxide (Fe_3O_4)
Urethane Shore A95 (LKBH only)

De9 (LKB only)		A	B	C	E	F	M×P	Link A size	Part Number		L	U/Price for 1~9	
									Type	D		LKB	LKBH
10	−0.025 −0.061	16	6	4	8	12	8×1.25	19	LKB LKBH	10	13	Quotation	
13	−0.032 −0.075	18	8	5	10	16	10×1.5	25		13			
16		24	10	7	14	18	12×1.75	32		16	20		
20	−0.040 −0.092	27	14	9	18	24	16×2.0	38		20			

■**Tension Link Retainers** RoHS

LKR (①+③)
LKRB (① only)

LKRH (②+③)
LKRBH (② only)



① ②Retainer
M S45C
H 38~43HRC
S Black oxide (Fe_3O_4)
Urethane Shore A95 (② only)
③Socket head cap screws

■**Retailer+Bolt**

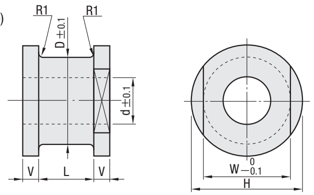
Link A size	d	D	H	L	③Bolt	Part Number		U/Price 1~9	
						Type	No.	LKR	LKRH
19	6.5	10	13	16	CB 6—25	LKR (①・③ Retainer, bolt)	10	Quotation	
				24	CB 6—35		10—24		
25	9	13	16	16	CB 8—30		13		
				24	CB 8—35		13—24		
32	11	16	19	16	CB10—30	LKRH (②・③ Retainer, bolt)	16		
				24	CB10—40		16—24		
38	13	20	23	16	CB12—35		20		
				24	CB12—45		20—24		

■**Retainer Only**

Part Number		U/Price 1~9	
Type	No.	LKRB	LKRBH
LKRB (① Retainer only)	10	Quotation	
	10—24		
	13		
	13—24		
LKRBH (② Retainer only)	16		
	16—24		
	20		
	20—24		

■**Tension Link Retainers** RoHS

LKT (①+②)
LKTB (① only)



①Retainer
M S45C
H 38~43HRC
S Black oxide (Fe_3O_4)
②Socket head cap screws

■**Retailer+Bolt**

Link A size	d	D・W	H	L	V	②Bolt	Part Number		U/Price
							Type	No.	1~9
19	6.5	10	16	11	3	CB 6—30	LKT (①・② Retainer, bolt)	10	Quotation
				18	4	CB 6—40		10—18	
25	9	13	19	11	3	CB 8—35		13	
				18	4	CB 8—40		13—18	
32	11	16	22	11	3	CB10—35		16	
				18	4	CB10—45		16—18	
38	13	20	26	11	3	CB12—40		20	
				18	4	CB12—50		20—18	

■**Retainer Only**

Part Number		U/Price
Type	No.	1~9
LKTB (① Retainer only)	10	Quotation
	10—18	
	13	
	13—18	
	16	
	16—18	
	20	
	20—18	

How to Mount P.1032

Order

Part Number	— L
LKB 13	— 20

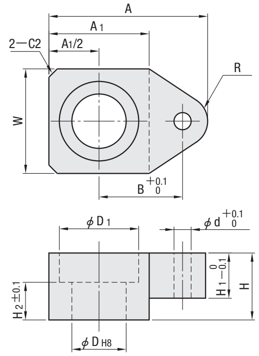
Days to Ship Quotation

Price Quotation

■**Features** Urethane type (LKBH/LKRH/LKRBH) is obtained by fitting urethane into standard type. (D dimension is made the same as conventional products.) Use for soundproofing when the mold is being opened.

TENSION CHAIN HOLDERS

RoHS **TCHH**



M S45C
S Trivalent chromate

A	A1	B	W	R	H	H1	H2	d	D	D1	Applicable parts		Part Number		U/Price
											Bolt	Chains	Type	No.	1~8
38	24	20	25	6	16	10.8	9	4.1	13	19	LKB13−13	TCHE40	TCHH	40	Quotation
46.5	30	24	32	7.5	22	13.4	16	5.2	16	25	LKB16−20	TCHE50		50	

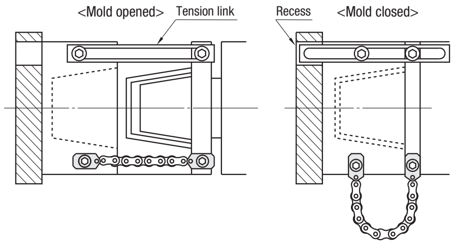
Order Part Number
TCHH40

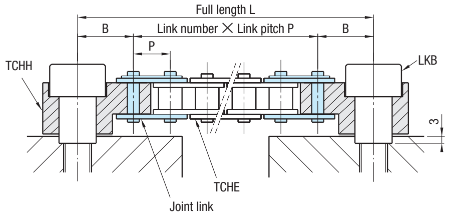
Price Quotation

Days to Ship Quotation

Example

・Example of stripper plate type application





■Features

- When molding products are long or deep (such stationery or cosmetics) and the tension chains are used, making recess on the plate is not required when the molds are closed.

■Note

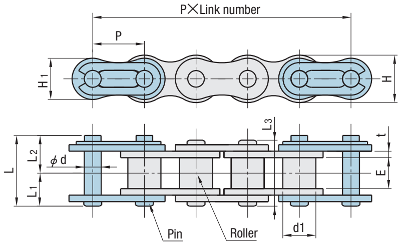
- Installation of tension chain holder onto the plate should be done by using bolt special for tension chains (LKB ☞ **P.1036**) and with 3mm counterbore on the plate in order to prevent bolt screw damage.
- Install at 4 points on the mold side when molding. (Do not install in vertical direction.)
- Please be careful about swing, sagging and damage in using chains.
- If positioning of chain holder is shifted, load concentrates on one chain and may cause damage.

ex Relation between full length L and link number
The number of Links N necessary for L=300mm, or more, when TCHH40
N=(L−2×B)/P
=(300−2×20)/12.7
=20.47
∴Number of links is 21.

TENSION CHAINS

Non JIS material definition is listed on P.1351 - 1352

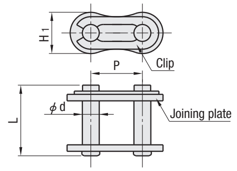
RoHS **TCHE**
(Chains)



Link number for this drawing is 5. (Link number 3+joint link number 2) Although there are two attached joint links in ▭ section, they are not connected to chain.

M Steel
H Rollers 45HRC~
Pins 45HRC~

RoHS **JNTC**
(Single Joint Link)



■Chains

H	H1	P	d	d1	L	L1	L2	L3	E	t	*Break away load	Chain No.	Part Number		Link number
											KN {kgf}	JIS	Type	No.	Designation in odd number
11.7	10.5	12.7	3.97	7.95	17.55	8.02	9.53	16.05	7.95	1.5	18.1 {1850}	40	TCHE	40	5~241
14.6	13.1	15.875	5.09	10.16	21.75	10.15	11.60	20.30	9.53	2	29.9 {3050}	50		50	5~193

■Single Joint Link (Joint links attached to TCHE can be purchased by single. Please use them when they are lost or broken.)

H1	P	d	L	Applicable chains	Part Number		U/Price	
					Type	No.	1~20	21~50
10.5	12.7	3.97	17.55	TCHE40	JNTC	40	Quotation	
13.1	15.875	5.09	21.75	TCHE50		50		

To be quoted on price & lead time above Max. Q'ty.

Order
・Chains Part Number — Link number
TCHE40 — 51
・Joint Link Part Number
JNTC40

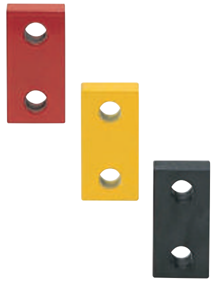
Days to Ship Quotation

Price Quotation

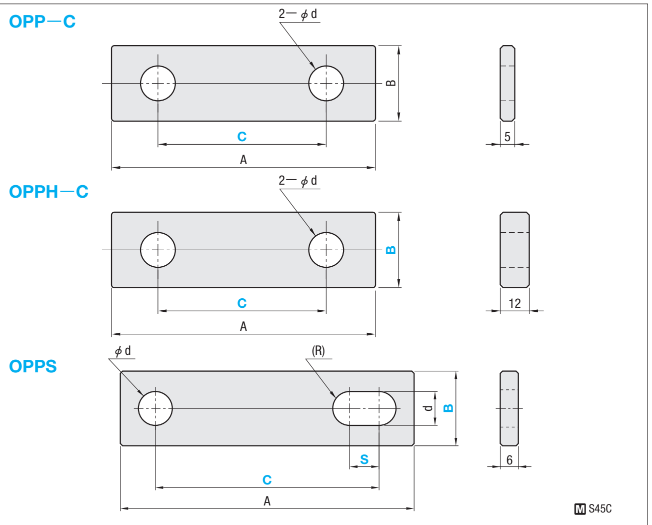
■Note

- Breaking load for chain* is a result of static tension test. Since impact load should be added in reality, please set the safety ratio 15, or more, (1/15 of breaking load)
- Lubricate regularly in order to reduce chain wear and noise.
- Chain plate or roller may break by fatigue when used for a long term. Please inspect regularly.

MOLD OPENING PREVENTION PLATES
—STANDARD TYPE—



RoHS



B	A	d	Part Number Type	C	Color Safety coloring	U/Price 1~4	5~19	20~49	50~
16	30	7	OPP—C	15	R (Red) Y (Yellow) N (Normal)	Quotation			
	40			20					
	50			30					
	60			40					
	70			50					
	80			60					
	90			70					
20	100	9		80					
	110			90					
	120			100					

d	A	Part Number Type	B	C	S Selection	Color Safety coloring	U/Price 1~9
7	50	OPPS	25	30	5 8 10	R (Red) Y (Yellow) N (Normal)	Quotation
	60			40			
	70			50			
	80			60			
9	100		38	80			
	110			90			
	120			100			
	130			110			
	140			120			
	150			130			

Order

Part Number	—	C	—	S	—	Color
OPP—C100					—	Y
OPPH—C25	—	50			—	R
OPPS25	—	30	—	5	—	Y

Days to Ship Quotation

Price Quotation

d	A	Part Number Type	B	C	Color Safety coloring	U/Price 1~4	5~19	20~49	50~
9	40	OPPH—C	25	20	R (Red) Y (Yellow) N (Normal)	Quotation			
	50			30					
	60			40					
	70			50					
	80			60					
	90			70					
	100			80					
14	80		38	50					
	90			60					
	100			70					
	110			80					
	120			90					
	130			100					

■About Safety Coloring

R (Red)
Y (Yellow)
N (Normal) (Black Oxide)

OPP—C · OPPS
OPPF · OPPSF ····› Safety coloring is a spray paint (acrylic lacquer). The color may fade when the mold temperature is high.

OPPH—C ····› Safety coloring is a simplified baking finish (melamine resin) and the resin may adhere to the mold under temperatures 80˚C or higher. Use paint remover to remove it.

· **Painting Sample**

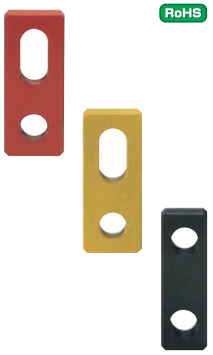
○Example of color

○Example of paint

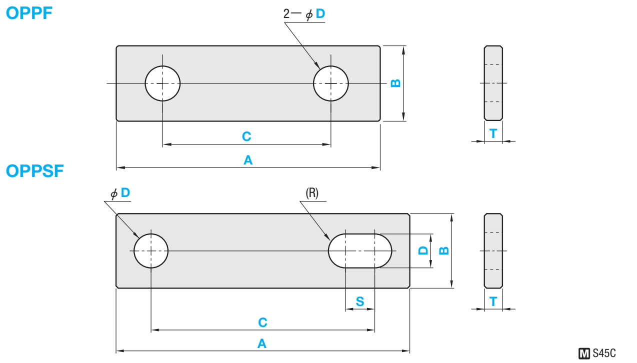
※During spray painting, color uneveness or painting uneveness may occur at certain.

MOLD OPENING PREVENTION PLATES
—L DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352



RoHS



Part Number Type	B	1mm increments A	C	Selection D	T	Color Safety coloring
OPPF	16	30~200	2D≦C≦A—2D	7 9	5 12	R (Red) Y (Yellow) N (Normal)
	20			7 9	5 12	
	25	30~300		9 14	12 16	
	38			9 14	12 16	

Part Number Type	B	1mm increments A	C	S	Selection D	T	Color Safety coloring
OPPSF	16	30~200	2D≦C≦A—2D	S≦C—2D	7 9	6 12	R (Red) Y (Yellow) N (Normal)
	20				7 9	6 12	
	25	30~300			9 14	12 16	
	38				9 14	12 16	

Order

Part Number	—	A	—	C	—	S	—	D	—	T	—	Color
OPPF16	—	A50	—	C30			—	D9	—	T5	—	R
OPPSF16	—	A60	—	C30	—	S10	—	D9	—	T6	—	Y

Days to Ship Quotation

Price Quotation

Alterations

(NT) — Part Number — A — C — S — D — T
NT — OPPSF — A60 — C30 — S10 — D9 — T6

Quotation

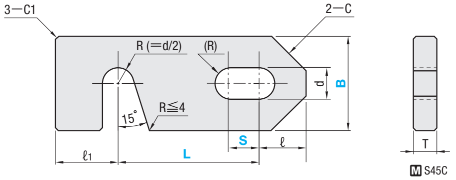
Alteration	Code	Spec.	Price
(No painting)	NT	Eliminates safety color painting. Note that it becomes vulnerable to rust since there is no painting.	Quotation

MOLD OPENING PREVENTION PLATES/URETHANE SPRINGS

—CUT-OUT L DIMENSION DESIGNATION TYPE—

■MOLD OPENING PREVENTION PLATES RoHS

DPPFN
(L dimension designation type)



M S45C

T	d	ℓ	ℓ1	C	Part Number Type	B	1mm increments L	S	Color Safety coloring
12	9	10	15	10	DPPFN	25	30≦L≦95	0≦S≦L−18	R (Red)
12	14	15	20	15		38	50≦L≦115	0≦S≦L−28	Y (Yellow)
20	22	25	30	15		50	60≦L≦145	0≦S≦L−44	N (Normal)

A round hole when S=0.
N(Normal) ···› S Black Oxide (Fe_3O_4)

Safety coloring is a spray paint (acrylic lacquer).
The color may fade when the mold temperature is high.

Order

Part Number	—	L	—	S	—	Color
DPPFN25	—	80	—	S20	—	Y

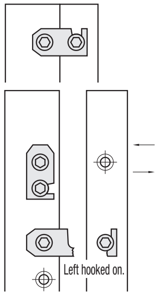
Days to Ship Quotation

Price Quotation

Example

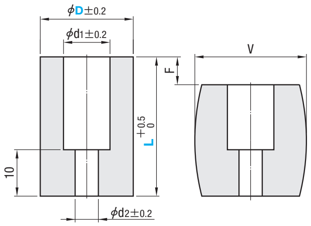
Use this plate to keep the mold closed when storing or moving it.

Even if molding is accidentally started with the plate hooked on, its cut-out section breaks first and keeps the die plates and holders undamaged.



■URETHANE SPRINGS RoHS

MAZ



H Shore A98

F=L×10% F mm	F=L×10% load N {kgf}	F=L×15% F mm	F=L×15% load N {kgf}	F=L×20% F mm	F=L×20% load N {kgf}	V	D	d1	d2	Bolt size	L	Part Number Type D — L	U/Price 1~19
1.5	860 {88}	2.2	1085 {111}	3.0	1296 {133}	18	15	8	5	M4	15	MAZ 15 —15	Quotation
2.0		3.0		4.0							20	20	
2.5		3.7		5.0							25	25	
2.0	3207 {327}	3.0	3854 {393}	4.0	4540 {463}	23.9	20	11	7	M6	20	MAZ 20 —20	
2.5		3.7		5.0							25	25	
3.0		4.5		6.0							30	30	
2.5	5894 {601}	3.7	7090 {723}	5.0	8306 {847}	29.9	25				25	MAZ 25 —25	
3.0		4.5		6.0							30	30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
3.0	8306 {847}	4.5	9954 {1015}	6.0	11640 {1187}	36	30	14	9	M8	30	MAZ 30 —30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	

● load (kgf)=loadN×0.101972

■Characteristic value

Item	Unit	Characteristic value
Hardness	Shore A	98
Tensile strength	MPa	47.9
Elongation	%	440
Heat resistant temperature	℃	100
Dissolution temperature	℃	200

The above value is the reference value. It is not a guarantee value.

Although urethane itself has a heat resistant temperature of 100˚C, when used continuously its durability falls, so use it at a temperature of no more than 80˚C.

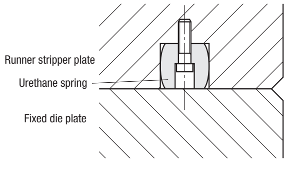
Order

Part Number
MAZ20—30

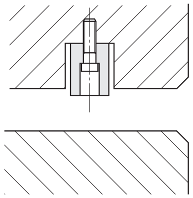
Days to Ship Quotation

Price Quotation

Example Use for returning the stripper plate earlier.



Mold closed

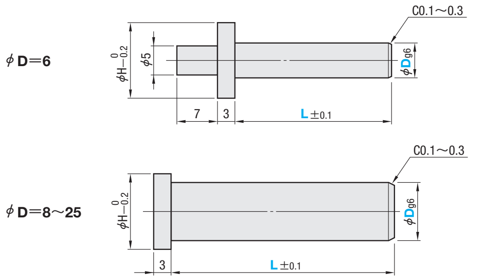


Mold opened

PUSHER PINS

Non JIS material definition is listed on P.1351 - 1352

RoHS **PSP**



M SK4
H 53~58HRC

Dg6		H	Part Number Type	D	L 1mm increments	U/Price 1~9
6	−0.004 −0.012	8	PSP	6	10~50	Quotation
8	−0.005 −0.014	10		8		
10		13		10		
13	−0.006 −0.017	16		13	10~70	
16		19		16		
20	−0.007 −0.020	23		20	20~80	
25		28		25		

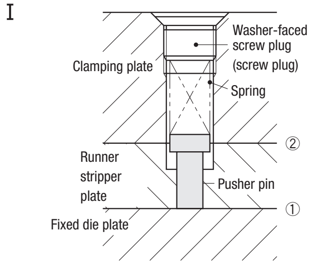
Order

Part Number	—	L
PSP8	—	15

Price Quotation

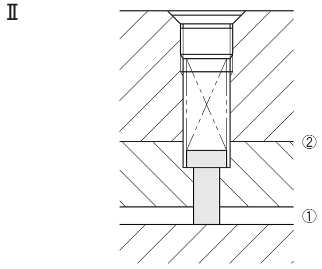
Days to Ship Quotation

■Notes



Combined with a spring and washer-faced screw plug (or a plain screw plug), the pusher pin provides functions required for three-plate mold opening and quick stripper plate return.

Spring································ P.1222~1396
Washer-faced screw plug············ P.1193
Screw plug ···························· P.1193



When a three-plate mold is opened, space ① between the base plate and runner stripper plate opens first.
To make area ② open smoothly, the spring's free length should be adjusted so that it still compresses the pusher pin in the state shown in Fig. II .

■Applicable Springs・Washer-faced Screw Plugs・(Plain) Screw Plugs

Pusher pin D	Pusher pin H	External diameter of springs Coils	External diameter of springs Wire springs	Washer-faced screw plug	Screw plug
6	8	—	8 or less	MSWZ 10	MSW 10
8	10	10 or less	10 or less	※MSWZ 12	※MSW 12
10	13	12.5 or less	13 or less	※MSWZ 16	※MSW 16
13	16	16 or less	16 or less	※MSWZ 18	※MSW 18
16	19	18 or less	18 or less	※MSWZ 22	※MSW 22
20	23	22 or less	22 or less	—	※MSW 27
25	28	27 or less	27 or less	—	※MSW 30

※Fine thread (Pitch 1.5)

COOLING ITEMS ① COUPLERS · QUICK FITTING JOINTS

**COOLING ITEMS ①
COUPLERS
QUICK
FITTING
JOINTS**

Product Name: Mold Couplers—Sockets · Heat resistant 80℃— —Sockets · Heat resistant 120℃ · Hose Attachment Type · Ball Lock Type · L-shaped · Female screw joint · Male screw joint type—
Part Number: KSH · KTSH KSM · KTSM KFF KTFF F120—KSH F120—KTSHBL F120—KSHL F120—KSM F120—KFF
Page: 1049 1049 1049 1049 1049 1049 1049 1049 1049

Mold Couplers—Plugs— Mold Couplers—Plugs— High Couplers for Cooling Pipe—Sockets · Heat resistant 80℃—
KPM JPSH JPS KPP LJPSH LJPS KPH LSPM LSP KHSH KHSM KHSF
1050 1050 1050 1051 1051 1051 1052 1053

—Sockets · Heat resistant 120℃— High Couplers for Cooling Pipe—Plugs—
F120—KHSH F120—KHSM F120—KHSF KHPM JPLH JPL KHPH KHPF LJPLH LJPL
1053 1055 1055 1055 1056 1056

High Couplers for Cooling Pipe—Plugs— Joints for Cooling Water—Slim Design Sockets— Joints for Cooling Water—Plugs—
JPHLM JPHL F120—MJTSH F120—MJTFF F120—MJTSL JPJ JPJH LJPJH LJPJ JPLJM JPLJ
1056 1056 1057 1058 1058 1059 1059 1059 1059

Valveless TSP Couplers for Cooling—Sockets— —Plugs— Large Flow Mold Couplers—Sockets · Plugs— Double Valves SP Couplers for Cooling—Sockets— —Plugs—
F120—TSH F120—TSF F120—TPM F120—TPF K□—KSH K□—KPM K3—JPSH F120—SF F120—PM F120—PF
1060 1060 1060 1060 1061 1061 1061 1062 1062 1062

Compact · Double Valves Cooling High Flow Couplers—Sockets · Plugs— Packing Products Mold Couplers—Plugs— High Couplers for Cooling Pipe Couplers (Stainless Steel)—Sockets—
F120—HFLS F120—HFLM F120—HFLP 50 · 100PACK—JPS 50 · 100PACK—JPL SF120—MFTF SF120—MJTFF
1063 1063 1063 1064 1064 1065 1065

Couplers (Stainless Steel)—Plugs— Double Valves SP Couplers for Cooling—Sockets— —(Stainless) Plugs— Compact · Double Valves Cooling High Flow Couplers—Sockets · Plugs— Valveless TSP Couplers for Cooling—Sockets—
SUS—JPSH SUS—JPLH SUS—JPJH SF120—SF SF120—PM SF120—PF SF120—HFLS SF120—HFLP SF120—TSH SF120—TSF
1066 1066 1066 1067 1067 1067 1068 1068 1068 1068

—(Stainless) Plugs— Hose Nipples L-Shaped Swivel Hose Nipples—Heat resistant 120℃—
SF120—TPM SF120—TPF NPWN□ NPWS NPWL NPW NPL LSNM LSN
1068 1068 1069 1070 1070

Quick-fitting Joints for Mold Cooling—Standard type (Heat resistant 60℃ series)— Quick-fitting Joints for Mold Cooling—Standard type (Heat resistant 60℃ series)— Quick-fitting Joints for Mold Cooling—Standard type (Heat resistant 80℃ series)—
M—PC M—PCX M—POC M—POCL M—PL M—POL M—PLL M—80PC M—80POC
1073 1073 1074 1074 1075 1075 1075 1076 1076

Quick-fitting Joints for Mold Cooling—For high temperature (Heat resistant 99℃ series)— Quick-fitting Joints for Mold Cooling—For high temperature (Heat resistant 120℃ series)— Quick-fitting Joints for Mold Cooling—For high temperature (Heat resistant 99℃ series)— —Components—
M—KC M—KOC M—KL M—KH M—120KC M—120KOC M—120KL M—120KH M—AKC M—AKL M—AKCP M—AKLP M—AK
1077 1077 1078 1078 1079 1079 1080 1080 1081 1081 1082 1082 1082

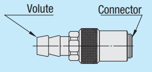
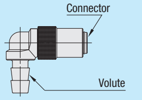
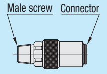
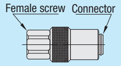
Quick-fitting Joints for Mold Cooling—For high temperature (Heat resistant 120℃ series)— —Components— Bolting Joints for Mold Cooling—For high temperature (Heat resistant 120℃ series)—
M—120AKC M—120AKL M—120AKCP M—120AKLP M—AK M—NSC M—NKC M—NSL M—NKL
1083 1083 1084 1084 1084 1086 1086

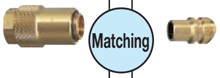
Mold coupling—Socket · plug— ~Heat resistance 180℃~ Mold high coupling—Socket · plug— ~Heat resistance 180℃~ Both valves sp coupling—Socket · plug—~Heat resistant 180℃~
10PACK—MKSH 10PACK—MKSM 10PACK—MKSF 10 · 30PACK—MKPM 10PACK—HKSH 10PACK—HKSM 10PACK—HKSF 10 · 30PACK—HKPM 10PACK—SPSF 10PACK—SPPM 10PACK—SPPF
1087 1087 1087 1087 1088 1088 1088 1088 1089 1089 1089

Both valves sp coupling—Stainless socket · plug—~Heat resistant 180℃~ Quick-fitting joints for mold cooling—Integrated plug · socket— —Standard (Heat resistant 60℃ series)— Bolting joints for mold—For high temperature (Heat resistant 180℃ series)—
10PACK—SPSFS 10PACK—SPPMS 10PACK—SPPFS 10 · 30PACK—ASC 10 · 30PACK—ASOC 10 · 30PACK—ASPL 10PACK—NASC 10PACK—NASL
1090 1090 1090 1091 1091 1091 1092 1092

GUIDE FOR COOLING COUPLERS

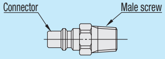
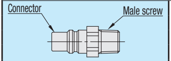
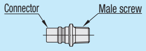
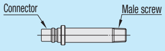
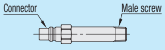
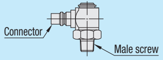
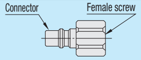
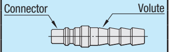
■MISUMI's Mold Coupler (NITTO' s Mold Coupler) Series　Applicable Joint Plug Connections

Misumi	Nitto	Sockets
KSH□ KTSH□ F120−KSH□ F120−KTSHBL□ P.1049	K□SH K□TSH K□SH (Fluoric rubber) —	 Volute Connector For hose attachment (Volute type)
F120−KSHL□ P.1049	K□SHL (Fluoric rubber)	 Connector Volute For hose attachment (L-shaped)
KSM□ KTSM□ F120−KSM□ P.1049	K□SM K□TSM K□SM (Fluoric rubber)	 Male screw Connector For female screw joint (With male screw)
KFF□ KTFF□ F120−KFF□ P.1049	K□SF K□TSF K□SF (Fluoric rubber)	 Female screw Connector For male screw joint



※Connector shape is common to all types.

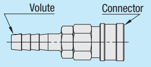
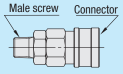
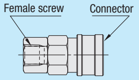
※Connector shape is common to all types.

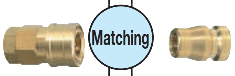
Plugs	Misumi	Nitto
 Connector Male screw Hexagonal head type	KPM□ P.1050	K□PM
 Connector Male screw Hexagonal head/hole type	JPSH□ P.1050	—
 Connector Male screw Hexagonal hole type	JPS□ P.1050	—
 Connector Male screw Hexagonal hole type	LJPS□ P.1051	—
 Connector Male screw Hexagonal head type	LJPSH□ P.1051	—
 Connector Male screw For L-shaped swivel tightening	LSPM□ LSP□ P.1052	— —
 Connector Female screw For male screw joint	KPP□ P.1050	K□PF
 Connector Volute For hose attachment (Volute type)	KPH□ P.1051	K□PH

Note that large flow mold couplers series have different connector size, and not applicable.

Note that large flow mold couplers series have different connector size, and not applicable.

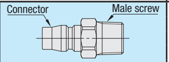
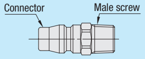
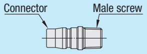
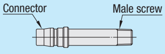
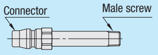
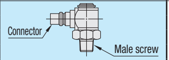
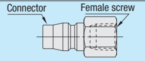
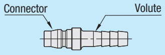
■MISUMI's High Coupler (NITTO's High Coupler) Series for Cooling Pipe　Applicable Joint Plug Connections

Misumi	Nitto	Sockets
KHSH□ F120−KHSH□ P.1053	□SH □SH (Fluoric rubber)	 Volute Connector
KHSM□ F120−KHSM□ P.1053	□SM □SM (Fluoric rubber)	 Male screw Connector For hose attachment (With male screw)
KHSF□ F120−KHSF□ P.1053	□SF □SF (Fluoric rubber)	 Female screw Connector For male screw joint



※Connector shape is common to all types.

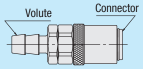
※Connector shape is common to all types.

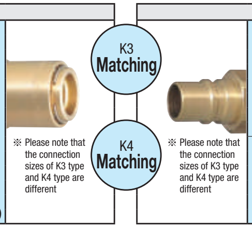
Plugs	Misumi	Nitto
 Connector Male screw Hexagonal head type	KHPM□ P.1055	□PM
 Connector Male screw Hexagonal head/hole type	JPLH□ P.1055	—
 Connector Male screw Hexagonal hole type	JPL□ P.1055	—
 Connector Male screw Hexagonal hole type	LJPL□ P.1056	—
 Connector Male screw Hexagonal head type	LJPLH□ P.1056	—
 Connector Male screw For L-shaped swivel tightening	JPHLM□ JPHL□ P.1056	—
 Connector Female screw For male screw tightening (Tapped type)	KHPF□ P.1055	□PF
 Connector Volute For hose attachment (Volute type)	KHPH□ P.1055	□PH

Note that Nitto high coupler 400S□, 600S□ and 800S□ have different connector size and not applicable.

Note that Nitto high coupler 400P□, 600P□ and 800P□ have different connector size and not applicable.

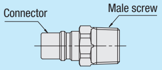
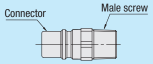
■MISUMI's Large Flow Mold Coupler (NITTO's Large Flow Mold Coupler) Series　Applicable Joint Plug Connections

Misumi	Nitto	Sockets
K3−KSH□ K4−KSH□ P.1061	K3−□SH K4−□SH	 Volute Connector For hose attachment (Volute type)

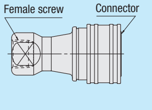

K3
Matching
K4
Matching

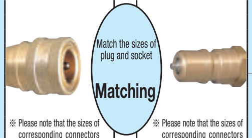
※ Please note that the connection sizes of K3 type and K4 type are different

※ Please note that the connection sizes of K3 type and K4 type are different

Plugs	Misumi	Nitto
 Connector Male screw Hexagonal head type	K3−KPM□ K4−KPM□ P.1061	K3−□PM K4−□PM
 Connector Male screw Hexagonal head/hole type	K3−JPSH□ P.1061	—

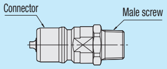
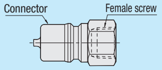
■MISUMI's Double Valves SP Coupler (NITTO's SP Coupler) Series for Cooling　Applicable Joint Plug Connections

Misumi	Nitto	Sockets
F120−SF□ SF120−SF□ P.1062 P.1067	□S−A (Fluoric rubber) □S−A (SUS) (Fluoric rubber)	 Female screw Connector For male screw tightening (Tapped type)

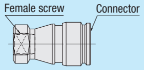

Match the sizes of plug and socket
Matching

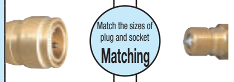
※ Please note that the sizes of corresponding connectors are different respectively.

※ Please note that the sizes of corresponding connectors are different respectively.

Plugs	Misumi	Nitto
 Connector Male screw Hexagonal head type	F120−PM□ SF120−PM□ P.1062 P.1067	□P−M (Fluoric rubber) □P−M (SUS) (Fluoric rubber)
 Connector Female screw For male screw joint	F120−PF□ SF120−PF□ P.1062 P.1067	□P (Fluoric rubber) □P (SUS) (Fluoric rubber)

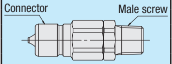
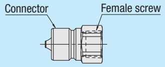
■MISUMI's Compact・Double Valves Cooling High Flow Coupler (NITTO's High Flow Coupler) Series　Applicable Joint Plug Connections

Misumi	Nitto	Sockets
F120−HFLS□ SF120−HFLS□ P.1063 P.1068	HFL−□S (Fluoric rubber) HFL−□S (SUS) (Fluoric rubber)	 Female screw Connector For male screw joint

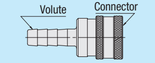
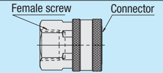

Match the sizes of plug and socket
Matching

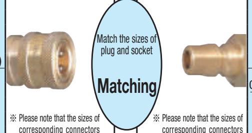
※ Please note that the sizes of corresponding connectors are different respectively.

※ Please note that the sizes of corresponding connectors are different respectively.

Plugs	Misumi	Nitto
 Connector Male screw Hexagonal head type	F120−HFLM□ P.1063	HFL−□P−M (Fluoric rubber)
 Connector Female screw For male screw joint	F120−HFLP□ SF120−HFLP□ P.1063 P.1068	HFL−□P (Fluoric rubber) HFL−□P (SUS) (Fluoric rubber)

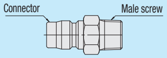
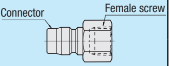
■MISUMI' Valveless TSP Coupler (NITTO's TSP Coupler) Series for Cooling　Applicable Joint Plug Connections

Misumi	Nitto	Sockets
F120−TSH□ SF120−TSH□ P.1060 P.1068	□TSH (Fluoric rubber) □TSH (SUS) (Fluoric rubber)	 Volute Connector For hose attachment (Volute type)
F120−TSF□ SF120−TSF□ P.1060 P.1068	□TSF (Fluoric rubber) □TSF (SUS) (Fluoric rubber)	 Female screw Connector For male screw tightening (Tapped type)

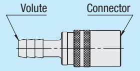
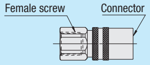
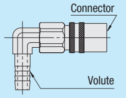

Match the sizes of plug and socket
Matching

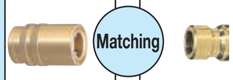
※ Please note that the sizes of corresponding connectors are different respectively.

※ Please note that the sizes of corresponding connectors are different respectively.

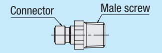
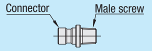
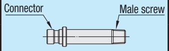
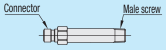
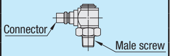
Plugs	Misumi	Nitto
 Connector Male screw For spanner/socket wrench tightening (Hexagonal head type)	F120−TPM□ SF120−TPM□ P.1060 P.1068	□TPM (Fluoric rubber) □TPM (SUS) (Fluoric rubber)
 Connector Female screw For male screw joint	F120−TPF□ SF120−TPF□ P.1060 P.1068	□TPF (Fluoric rubber) □TPF (SUS) (Fluoric rubber)

■MISUMI's Cooling Joint Series (Applicable to Defitight Sockets.)　Applicable Joint Plug Connections

Misumi	Sockets
F120−MJTSH□ P.1057	 Volute Connector Slim Design For hose attachment (Volute type)
F120−MJTFF□ P.1057	 Female screw Connector For male screw joint
F120−MJTSL□ P.1057	 Connector Volute For hose attachment (L-shaped)



※Connector shape is common to all types.

Plugs	Misumi
 Connector Male screw Hexagonal head/hole type	JPJH□ P.1058
 Connector Male screw Hexagonal hole type	JPJ□ P.1058
 Connector Male screw Hexagonal hole type	LJPJ□ P.1059
 Connector Male screw Hexagonal head type	LJPJH□ P.1059
 Connector Male screw For L-shaped swivel tightening	JPLJM□ JPLJ□ P.1059

GUIDE FOR COOLING COUPLERS

■Specifications of Sockets

Classification	Mold Coupler Series		High Coupler Series for Cooling Pipe		Slim Design Sockets Series
Category	80℃	120℃	80℃	120℃	120℃
Part Number	**KSH ・KTSH** **KSM・KTSM** **KFF ・KTFF** P.1049	**F120—KSH** **F120—KTSHBL** **F120—KSM** **F120—KFF** **F120—KSHL** P.1049	**KHSH** **KHSM** **KHSF** P.1053	**F120—KHSH** **F120—KHSM** **F120—KHSF** P.1053・1060	**F120—MJTSH** **F120—MJTFF** **F120—MJTSL** P.1060・1057
Applicable fluid	Water		Water		Water
Body material	Brass		Brass		Brass
Sealing material	Nitrile rubber	Fluoric rubber	Nitrile rubber	Fluoric rubber	Fluoric rubber
Usable temperature range	—5℃～80℃	—5℃～120℃	—5℃～80℃	—5℃～120℃	—5℃～120℃
Working pressure kPa (kgf/cm^2)	980(10)		980(10)		980(10)
Maximum pressure kPa (kgf/cm^2)	1470(15)		1470(15)		1470(15)
Vacuum application	Unsuitable		Unsuitable		Unsuitable

Classification	Valveless TSP Coupler Series for Cooling	Large Flow Mold Couplers Series	Double Valves SP Coupler Series for Cooling	Compact・Double Valves Cooling High Flow Couplers Series
Category	120℃	80℃	120℃	120℃
Part Number	**F120—TSH** **SF120—TSH** **F120—TSF** **SF120—TSF** P.1060・1068	**K3—KSH** **K4—KSH** P.1061	**F120—SF** **SF120—SF** P.1062・1067	**F120—HFLS** **SF120—HFLS** P.1063・1068
Applicable fluid	Water	Water	Water	Water
Body material	Brass・Stainless steel	Brass	Brass・Stainless steel	Brass・Stainless steel
Sealing material	Fluoric rubber	Nitrile rubber	Fluoric rubber	Fluoric rubber
Usable temperature range	—5℃～120℃	—5℃～80℃	—5℃～120℃	—5℃～120℃
Working pressure kPa (kgf/cm^2)	980(10)	980(10)	980(10)	980(10)
Maximum pressure kPa (kgf/cm^2)	1470(15)	1470(15)	1470(15)	1470(15)
Vacuum application	Unsuitable	Unsuitable	Unsuitable	Unsuitable

■Maximum Tightening Torque for Plug Attachment

No.	R(PT)	M Max. tightening torque for brass (C3604) N・cm{kgf・cm}		M Max. tightening torque for Stainless steel (SUS303) N・cm{kgf・cm}	
		With Hexagonal Wrench	With Spanner/Socket Wrench	With Hexagonal Wrench	With Spanner/Socket Wrench
1	1/8	690N・cm {70kgf・cm}	490N・cm {50kgf・cm}	1370N・cm {140kgf・cm}	880N・cm {90kgf・cm}
2	1/4	1080N・cm {110kgf・cm}	880N・cm {90kgf・cm}	1760N・cm {180kgf・cm}	1370N・cm {140kgf・cm}
3	3/8	1470N・cm {150kgf・cm}	1080N・cm {110kgf/cm}	—	2150N・cm {220kgf・cm}
4	1/2	—	2940N・cm {300kgf/cm}	—	5880N・cm {600kgf・cm}

■When using

- Tighten the plug under the maximum tightening torque.
- Please use within the allowable temperature.
- Do not use the mold couplers for any other purposes than water cooling.
- Select an appropriate hose and hose band for the socket.

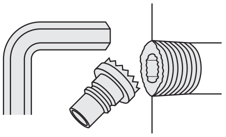
■About Plugs (KHPH/JPLH/SUS-JPLH/JPL/LJPL/LJPLH) of High Couplers Series for Cooling Pipe

Embedding in the mold is not appropriate concerning KHPH・JPLH・SUS—JPLH・JPL・LJPL・LJPLH due to the structure of the connecting socket. Use the unit after mounting them outside the mold.
(At the time of attachment/detachment, counterbore diameter that a hand can fully enter is necessary due to its structure in which the socket tip is pulled by hand to attach/detach the socket.)

■About Plugs for Hexagonal Wrench Installation

Even if the plug is accidentally broken, it can be easily removed as the hole inside shaped hexagonal so that an Allen wrench fits.

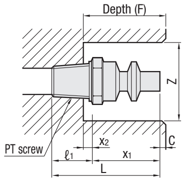
ex Example



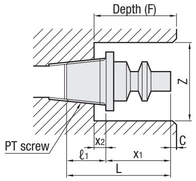
■How to Embed Cooling Plugs into Mold

■Standard Type

With hexagonal head **KPM・JPSH・JPJH**



With hole for hexagonal wrench **JPS・JPJ**

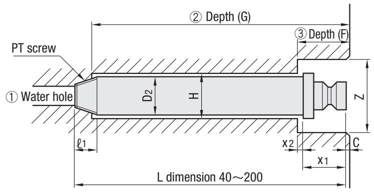


Notes: 1. Setting C dimension over 3mm will cause the socket to bump on the mold and make attaching/detaching impossible.
2. X_2(Reference values) Appropriate dimensions vary depending on the hole diameter as well as the tapping depth and finishing level.
3. JPS, JPJ shown in ( ) indicate the diameter of a counterbore for using a JIS B4636 socket wrench.

Cooling-use Plug (Standard type)							Attachment Hole				
Part Number		Tapered male thread R(PT)	Full length L	Thread length ℓ_1	x_1	x_2 (reference value)	C	Counterbore depth F (reference value)	Z (Counterbore hole diameter)		Tapered female thread Rc(PT)
Type	No.								When using hexagonal wrench	When using socket wrench	
KPM	1	1/8	31	10	21	2～4	less than 3mm	$21+X_2$	—	20～	1/8
	2	1/4	34	13	21	2～4		$21+X_2$	—	23～	1/4
	3	3/8	35	14	21	3～5		$21+X_2$	—	29～	3/8
JPS	1	1/8	27	9	18	2～4		$18+X_2$	19～	—	1/8
	2	1/4	29	11	18	2～4		$18+X_2$	19～	—	1/4
	3	3/8	37	12	22	3～5		$22+X_2$	22～	(29～)	3/8
JPSH	1	1/8	29	9	20	2～4		$20+X_2$	19～	20～	1/8
	2	1/4	31	11	20	2～4		$20+X_2$	19～	23～	1/4
JPJ	1	1/8	22.4	9	13.4	2～4		$13.4+X_2$	18～	—	1/8
	2	1/4	24.2	11	13.4	2～4		$13.4+X_2$	18～	—	1/4
	3	3/8	32.4	12	17.4	3～5		$17.4+X_2$	22～	(29～)	3/8
JPJH	1	1/8	24.4	9	15.4	2～4		$15.4+X_2$	18～	20～	1/8
	2	1/4	26.4	11	15.4	2～4		$15.4+X_2$	18～	23～	1/4

■Long Type

(LJPS・LJPJ)

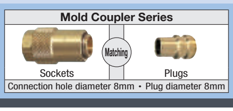


Notes: 1. Setting C dimension over 3mm will cause the socket to bump on the mold and make attaching/detaching impossible.
2. X_2 (Reference values) Appropriate dimensions vary depending on the hole diameter as well as the tapping depth and finishing level.
3. Because there is no outer hexagonal flange in LJPS, LJPJ, they can not be attached by using socket wrench. Please use an Allen wrench to attach them.
4. Normally, the boring process takes place in the order of ① water hole, ② H diameter depth (G) processing, ③ Z diameter depth and (F) processing.
(Reference) Calculation of H diameter hole depth (G): $G=(L+X_2)-\ell_1$
ex. When LJPJ1—100: $(100+3)-9=94$.
* This value varies depending the level of finishing on the tap hole.

Cooling-use Plug (Long type)								Attachment Hole					
Part Number		Tapered male thread R(PT)	Full length L	Thread length ℓ_1	Shaft dia. D_2	x_1	x_2 (reference value)	C	Counterbore depth F (reference value)	Z (Counterbore hole diameter)		H (reference value)	Tapered female thread Rc(PT)
Type	No.									When using hexagonal wrench	When using socket wrench		
LJPS	1	1/8	40～200	9	10	19	2～4	less than 3mm	$19+X_2$	19～	—	11	1/8
	2	1/4	40～200	11	13.2	19	2～4		$19+X_2$	19～	—	14	1/4
	1	1/8	40～200	9	10	14.4	2～4		$19+X_2$	18～	—	11	1/8
LJPJ	2	1/4	40～200	11	13.2	14.4	2～4		$19+X_2$	18～	—	14	1/4

MOLD COUPLERS

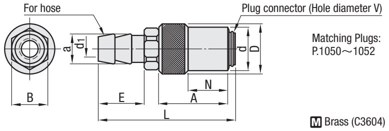
—SOCKETS—　～HEAT RESISTANT 80℃ • 120℃ SERIES～


Mold Coupler Series
Sockets
Matching
Plugs
Connection hole diameter 8mm • Plug diameter 8mm

RoHS

For hose attachment

KSH (Heat resistant 80℃ • Standard)
KTSH (Heat resistant 80℃ • No valve)
F120—KSH
(Heat resistant 120℃ • Standard)


For hose
Plug connector (Hole diameter V)
a
d1
d
D
B
E
N
A
L

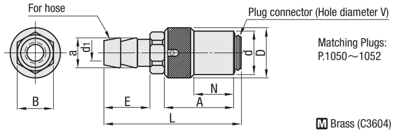
Matching Plugs:
P.1050～1052

M Brass (C3604)

RoHS

For hose attachment
(Ball lock type)

F120—KTSHBL
(Heat resistant 120℃ • No valve)


For hose
Plug connector (Hole diameter V)
a
d1
d
D
B
E
N
A
L

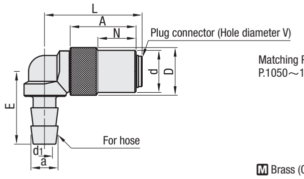
Matching Plugs:
P.1050～1052

M Brass (C3604)

RoHS

For hose attachment (L-shaped)

F120—KSHL
(Heat resistant 120℃ • Standard)


L
A
N
Plug connector (Hole diameter V)
d
D
E
For hose
d1
a

Matching Plugs:
P.1050～1052

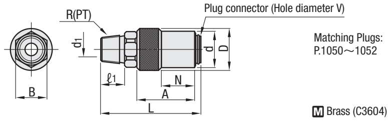
M Brass (C3604)

RoHS

KTSM doesn't correspond to RoHS.

Female screw joint type

KSM (Heat resistant 80℃ • Standard)
KTSM (Heat resistant 80℃ • No valve)
F120—KSM
(Heat resistant 120℃ • Standard)


R(PT)
Plug connector (Hole diameter V)
d1
d
D
B
ℓ1
N
A
L

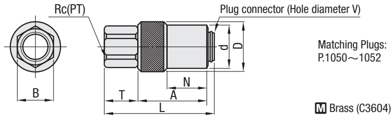
Matching Plugs:
P.1050～1052

M Brass (C3604)
Thread　JIS B0203 tapered thread for tubing R(PT)

RoHS

Male screw joint type

KFF (Heat resistant 80℃ • Standard)
KTFF (Heat resistant 80℃ • No valve)
F120—KFF
(Heat resistant 120℃ • Standard)


Rc(PT)
Plug connector (Hole diameter V)
d
D
B
T
N
A
L

Matching Plugs:
P.1050～1052

M Brass (C3604)
Thread　JIS B0203 tapered thread for tubing Rc(PT)

Matching Plug	Plug connection parts					L	d1	Allen side	For hose		Tapered male thread	ℓ1	Tapered female thread	T	Part Number		U/Price 1～9			
	Hole diameter																Heat resistant 80℃		Heat resistant 120℃	
	V	d	D	A	N			B	a	E	R(PT)		Rc(PT)		Type	No.	Standard	No valve	Standard	No valve
Mold Coupler Series Plug tip diameter V=8 Common to all sizes	8	18.5	21	29	16.8	67	5	17	8	29	—	—	—	—	For hose attachment KSH KTSH F120—KSH	2	Quotation			
						59	7		12	21						3				
	8	18.5	21	29	16.8	67	5	17	8	29	—	—	—	—	For hose attachment (Ball lock type) F120—KTSHBL	2				
						59	7		12	21						3				
	8	18.5	21	29	16.8	43	5	—	8	32	—	—	—	—	For hose attachment (L-shaped) F120—KSHL	2				
							7		12							3				
	8	18.5	21	29	16.8	51	6	17	—	—	1/4	13	—	—	Female screw joint type KSM KTSM F120—KSM	2				
						52		19			3/8	14				3				
	8	18.5	21	29	16.8	46.5	—	17	—	—	—	—	1/4	14.5	Male screw joint type KFF KTFF F120—KFF	2				

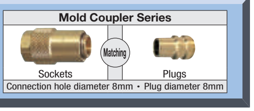
Matching Plug: MISUMI's Mold Couplers　KPM • JPSH • JPS • LJPS • LJPSH • KPH • KPP • LSP • LSPM **P.1050～P.1052**
Nitto's Mold Couplers　K□□PM (Ex. K01PM) • K□□PH (Ex. K01PH) • K□□PF

Matching Joint Plug Connections **P.1045**　Guide for Sockets **P.1047 • 1048 • 1317～1320**　Use in normal pressure 980 kPa (10kgf/cm^2) or lower.
Keep water temperature under the allowable temperature.
KTSH, KTSM, KTFF and F120—KTSHBL, there is no automatic open/close valve. Please confirm the hydraulic pressure and water temperature before removing the socket.

Order	Part Number KSH 2	Days to Ship	Quotation
Price	Quotation		

MOLD COUPLERS

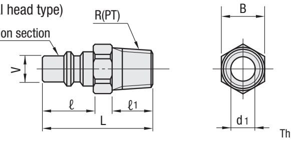
—PLUGS—


Mold Coupler Series
Sockets
Matching
Plugs
Connection hole diameter 8mm • Plug diameter 8mm

Non JIS material definition is listed on P.1351 - 1352

RoHS

KPM (Hexagonal head type)


R(PT)
※Socket connection section
V
ℓ
ℓ1
L
B
d1

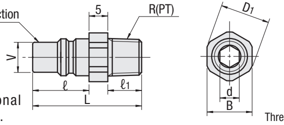
Matching Sockets: P.1049

M Brass (C3604)
Thread　JIS B0203 tapered thread for tubing R(PT)

RoHS

JPSH (Hexagonal head • hole type)

※Socket connection section


5
R(PT)
V
ℓ
ℓ1
L
D1
d
B

Through hexagonal hole for wrenching.

Matching Sockets: P.1049

M Brass (C3604)
Thread　JIS B0203 tapered thread for tubing R(PT)

RoHS

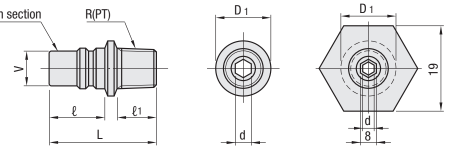
JPS1 • 2

RoHS

JPS3

JPS (Hexagonal hole type)　**JPS1 • 2**　**JPS3** (With hexagonal flange)

Matching Sockets: P.1049

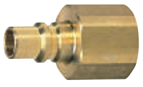

※Socket connection section
R(PT)
V
ℓ
ℓ1
L
D1
d
D1
19
d
8

Through hexagonal hole for wrenching.

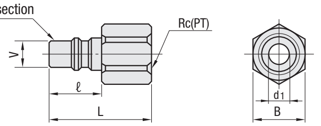
M Brass (C3604)
Thread　JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	Inner dia.	Hexagonal wrench socket ⬡d	Tapered thread	ℓ1	Part Number		U/Price
	V	ℓ			B	d1		R(PT)		Type	No.	1～9
Mold Coupler Series Socket hole diameter V=8 Common to all sizes	8	15	31	—	12	5.5	—	1/8	10	With hexagonal head KPM (Brass)	1	Quotation
			34		14	6		1/4	13		2	
			35		19			3/8	14		3	
	8	15	29	(13.5)	12	—	⬡5	1/8	9	Hexagonal head/hole type JPSH (Brass)	1	
			31	(15.5)	14			1/4	11		2	
	8	15	27	13	—	—	⬡5	1/8	9	Hexagonal hole type JPS (Brass)	1	
			29	14				1/4	11		2	
		18	37	13	19			3/8	12		3	

RoHS



KPP (Male screw reception type)


※Socket connection section
Rc(PT)
V
ℓ
L
d1
B

Matching Sockets: P.1049

M Brass (C3604)
Thread　JIS B0203 tapered thread for tubing Rc(PT)

Matching Sockets	Socket connection parts		L	Allen side	Inner dia.	Tapered female thread	Part Number		U/Price
	V	ℓ		B	d1	Rc(PT)	Type	No.	1～9
Mold Coupler Series Socket hole diameter V=8 Common to all sizes	8	15	28	14	6	1/8	Male screw joint type KPP (Brass)	1	Quotation
			30.5	17		1/4		2	

Matching Sockets: MISUMI's mold couplers　KSH • KTSH • KSM • KTSM • KFF • KTFF • F120—KSH • F120—KSM • F120—KFF • F120—KSHL • F120—KTSHBL **P.1049**
Nitto's Mold Couplers　K□□SH (Ex.K02SH) • K□□TSH • K□□SM (Ex.K02SM) • K□□TSM • K□□SF • K□□TSF • K□□SHL

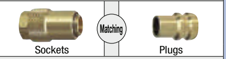
Matching Joint Plug Connections **P.1045**　Guide for Sockets • Plugs **P.1047 • 1317～1320**
Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Order	Part Number KPM 1 JPSH 2 JPS 2	Days to Ship	Quotation
Price	Quotation		

MOLD COUPLERS

—PLUGS—

Mold Coupler Series

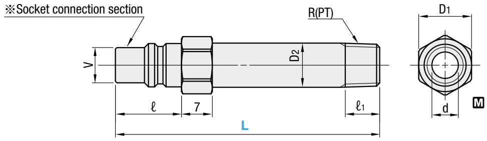


Connection hole diameter 8mm・Plug diameter 8mm

RoHS

LJPSH (Hexagonal head long type)

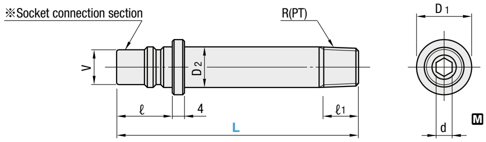
Matching Sockets: P.1049



M Brass (C3604)
Thread
JIS B0203
Tapered thread for tubing R(PT)

LJPS (Hexagonal hole long type)

Matching Sockets: P.1049



M Brass (C3604)
Thread
JIS B0203
Tapered thread for tubing R(PT)

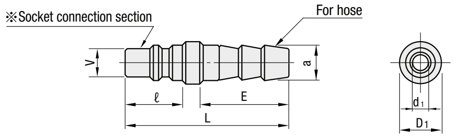
Through hexagonal hole for wrenching on both ends.
The hex-wrench hole extends to a point mid-way from both ends. It is not fully pierced.

Matching Sockets	Socket connection parts V	Socket connection parts ℓ	D1	D2	d	Tapered thread R(PT)	ℓ1	Part Number Type	Part Number No.	L	
Mold Coupler Series Socket hole diameter V=8 Common to all sizes	8	15	12	10	6	1/8	9	Hexagonale head, long **LJPSH** (Brass)	1	100 110 120 130 140 150 200	
			14	13.2		1/4	11		2		
	8	15	14	10	⬡5	1/8	9	Hexagonale hole, long **LJPS** (Brass)	1	40～115 (5mm increments)	120～200 (10mm increments)
				13.2		1/4	11		2		

RoHS

KPH (For hose)

Matching Sockets: P.1049



M Brass (C3604)

Matching Sockets	Socket connection parts V	Socket connection parts ℓ	L	D1	Inner dia. d1	Applicable hoses	For hose a	For hose E	Part Number Type	Part Number No.	U/Price 1～9
Mold Coupler Series Socket hole diameter V=8 Common to all sizes	8	15	42	12	5	1/4	8	21	For hose **KPH** (Brass)	2	Quotation
				15	6	3/8	12	21		3	

- Matching Sockets: MISUMI's mold coupler KPM・JPSH・JPS・LJPS・LJPSH・KPH・KPP・LSP・LSPM **P.1050～1052**
  Nitto's Mold Couplers K□□SH (Ex.K02SH)・K□□TSH・K□□SM (Ex.K02SM)・K□□TSM・K□□SF・K□□TSF・K□□SHL
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Order

Part Number	—	L
LJPSH2	—	100
LJPS 2	—	100
KPH 2		

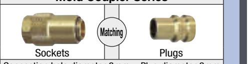
Days to Ship Quotation

Price Quotation

MOLD COUPLERS

—PLUGS—

Mold Coupler Series



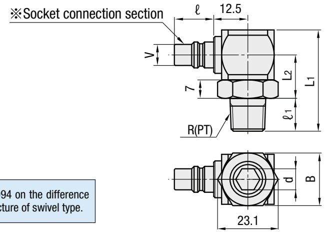
Connection hole diameter 8mm・Plug diameter 8mm

Non JIS material definition is listed on P.1351 - 1352

RoHS

LSPM (L-shaped swivel type —Constant flow type—)

Matching Sockets: P.1049



Refer to P.1094 on the difference of inner structure of swivel type.

M Body: Brass (C3604)
Inner parts: Brass (C2700W)
Fluoric rubber
Fluoric rubber grease

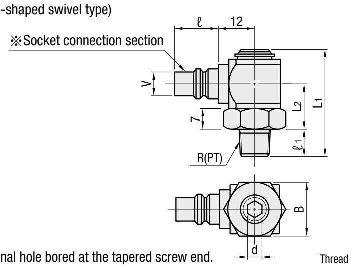
Hexagonal hole bored at the tapered screw end.

Thread JIS B0203 tapered thread for tubing R(PT)

RoHS

LSP (L-shaped swivel type)

Matching Sockets: P.1049



M Brass (C3604)

Hexagonal hole bored at the tapered screw end.

Thread JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts V	Socket connection parts ℓ	L1	L2	Allen side B	Hexagonal wrench socket ⬡d	Tapered thread R(PT)	ℓ1	Part Number Type	Part Number No.	U/Price 1～9
Mold Coupler Series Socket hole diameter V=8 Common to all sizes	8	15	35.5	16.5	20	⬡6	1/8	9.5	L-shaped swivel type —Constant flow type— **LSPM** (Brass)	1	Quotation
			38.5			⬡8	1/4	12.5		2	
			39.5				3/8	13.5		3	
	8	15	36.5	15.75	19	⬡6	1/8	9.5	L-shaped swivel type **LSP** (Brass)	1	
			39.5			⬡8	1/4	12.5		2	
			42.5	17.75			3/8	13.5		3	

- Matching Sockets: MISUMI's mold couplers KSH・KTSH・KSM・KTSM・KFF・KTFF・F120—KSH・F120—KSM・F120—KFF・F120—KSHL・F120—KTSHBL **P.1049**
  Nitto's Mold Couplers K□□SH (Ex.K02SH)・K□□TSH・K□□SM (Ex.K02SM)・K□□TSM・K□□SF・K□□TSF・K□□SHL
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under **120**℃.

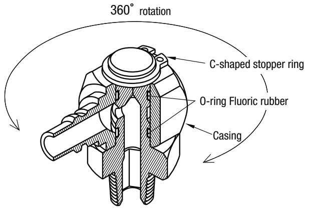
Order

Part Number
LSPM 1
LSP 2

Days to Ship Quotation

Price Quotation

Example

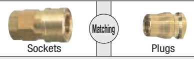


- As for L-Shaped Swivel Plugs, the tube extraction angle can be altered by turning its head after tightening the screw.
- Note that intermittent or continuous turning of the head could damage the O-ring, which results in water leakage.

HIGH COUPLERS FOR COOLING PIPE

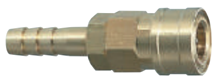
—SOCKETS— ～HEAT RESISTANT 80℃ · 120℃ SERIES～

High Coupler Series for Cooling Pipe



Connection hole diameter 10.9mm · Plug diameter 10.9mm

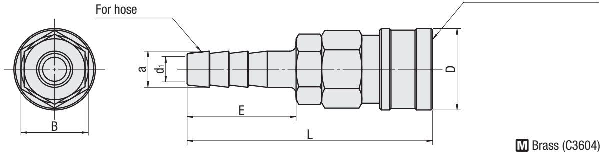
RoHS



For hose attachment

Matching Plugs: P.1055 · 1056

KHSH (Heat Resistant 80℃)
F120—KHSH (Heat Resistant 120℃)



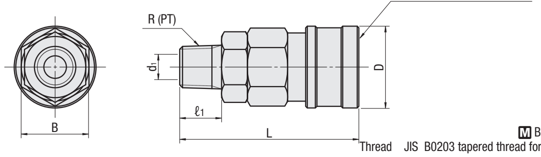
M Brass (C3604)

RoHS

Female screw joint type

Matching Plugs: P.1055 · 1056

KHSM (Heat Resistant 80℃)
F120—KHSM (Heat Resistant 120℃)



M Brass (C3604)

Thread JIS B0203 tapered thread for tubing R(PT)

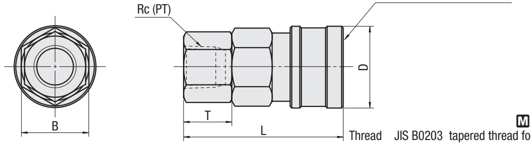
F120—KHSM doesn't correspond to RoHS.

RoHS

Male screw joint type

Matching Plugs: P.1055 · 1056

KHSF (Heat Resistant 80℃)
F120—KHSF (Heat Resistant 120℃)



M Brass (C3604)

Thread JIS B0203 tapered thread for tubing Rc(PT)

Matching Plug	Plug connection parts		L	d1	Allen side B	For hose		Tapered male thread R(PT)	ℓ1	Tapered female thread Rc(PT)	T	Part Number		U/Price 1～9	
	Hole diameter V	D				a	E					Type	No.	Heat resistant 80℃	Heat resistant 120℃
High Coupler Series Plug tip diameter V=10.9	10.9	25.4	72.5	5	21	9	30	—	—	—	—	For hose attachment KHSH F120—KHSH	2	Quotation	
			76.5	7.5		11.3	34						3		
			55.5	7		—	—	1/4	13	—	—	For female screw joint KHSM F120—KHSM	2		
			56.5	8				3/8	14				3		
			49.5	—		—	—	—	—	1/4	13	For male screw joint KHSF F120—KHSF	2		

- Matching Plug: MISUMI's high couplers for cooling pipe KHPM · JPLH · JPL · LJPL · KHPH · KHPF · JPHL · JPHLM **P.1056**
  Nitto's high couplers □□PM · □□PH · □□PF
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets **P.1047 · 1048 · 1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under the allowable temperature.
- Note when above plug is embedded into the mold, it may be unable to remove the socket.
- No automatic open/close valve on the plug side of high couplers for cooling pipe. Please confirm the hydraulic pressure and water temperature before removing the socket. Please be careful especially when the water temperature is high.

Order Part Number
KHSH 3

Price Quotation

Days to Ship Quotation

■When using

- Tighten the plug under the maximum tightening torque.
- Please use within the allowable temperature.
- Do not use the mold couplers for any other purposes than water cooling.
- Select an appropriate hose and hose band for the socket.

■About Plugs (KHPH/JPLH/SUS-JPLH/JPL/LJPL/LJPLH) of High Couplers Series for Cooling Pipe

Embedding in the mold is not appropriate concerning KHPH · JPLH · SUS—JPLH · JPL · LJPL · LJPLH due to the structure of the connecting socket. Use the unit after mounting them outside the mold.
(At the time of attachment/detachment, counterbore diameter that a hand can fully enter is necessary due to its structure in which the socket tip is pulled by hand to attach/detach the socket.)

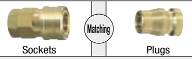
■About Plugs for Hexagonal Wrench Installation

Even if the plug is accidentally broken, it can be easily removed as the hole inside shaped hexagonal so that an Allen wrench fits.

HIGH COUPLERS FOR COOLING PIPE

—PLUGS—

High Coupler Series for Cooling Pipe



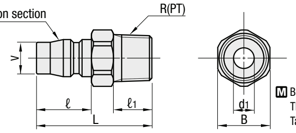
Sockets Plugs

Connection hole diameter 10.9mm • Plug diameter 10.9mm

RoHS

KHPM
(Hexagonal head type)

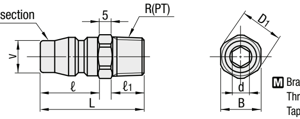
Matching Sockets: P.1053



M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

JPLH
(Hexagonal head/hole type)

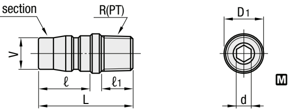
Matching Sockets: P.1053



M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

JPL
(Hexagonal hole type)

Matching Sockets: P.1053



Through hexagonal hole for wrenching.

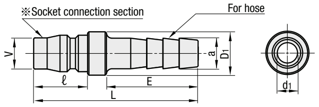
M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	Inner dia.	Hexagonal wrench socket	Tapered	ℓ_1	Part Number		U/Price
	V	ℓ			B	d1	⌬d	thread R(PT)		Type	No.	1~9
High couplers series Socket hole diameter V=10.9	10.9	20	37	—	14	7.5	—	1/8	10	Hexagonal head type KHPM (Brass)	1	Quotation
			41					1/4	13		2	
			42		19			3/8	14		3	
	10.9	20	34	(15.5)	14	—	⌬6	1/8	9	Hexagonal head/hole type JPLH (Brass)	1	
			36					1/4	11		2	
	10.9	20	32	14	—	—	⌬6	1/8	9	Hexagonal hole type JPL (Brass)	1	
			34	14				1/4	11		2	
			37	18				3/8	14		3	

RoHS

KHPH
(For hose attachment)

Matching Sockets: P.1053

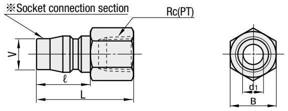


M Brass (C3604)

RoHS

KHPF
(For male screw joint)

Matching Sockets: P.1053



M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing Rc(PT)

Matching Sockets	Socket connection parts		L	D1	Inner dia.	For hose		Part Number		U/Price
	V	ℓ			d1	a	E	Type	No.	1~9
High couplers series Socket hole dia. V=10.9	10.9	20	57	16	7.5	9	30	For hose attachment KHPH (Brass)	2	Quotation
			61			11.3	34		3	

Matching Sockets	Socket connection parts		L	Allen side	Inner dia.	Tapered female	Part Number		U/Price
	V	ℓ		B	d1	screw Rc(PT)	Type	No.	1~9
High couplers series Socket hole dia. V=10.9	10.9	20	32	14	7.5	1/8	For male screw joint KHPF (Brass)	1	Quotation
			36	17		1/4		2	

Matching sockets: MISUMI's high couplers for cooling pipe KHSH • KHSM • KHSF • F120—KHSH • F120—KHSM • F120—KHSF P.1053
Nitto's high couplers □□SH (Ex. 20SH) • □□SM (Ex. K20SM) • □□SF

Matching Joint Plug Connections P.1045 Use in normal pressure 980kPa (10kgf/cm^2) or lower.

Order

Part Number	
JPLH	2
JPL	2
KHPH	2
KHPF	2

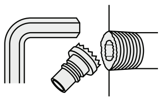
Days to Ship Quotation

Price Quotation

■ Mounting KHPM • JPLH • JPL • LJPL • LJPLH to Mold

Embedding in the mold is not appropriate concerning KHPM/JPLH/JPL/LJPL/LJPLH due to the structure of the connecting socket. Use the unit after mounting them outside the mold. (At the time of attachment/detachment, counterbore diameter that a hand can fully enter is necessary due to its structure in which the socket tip is pulled by hand to attach/detach the socket.) P.1047

Example



When an unexpected accident results in the cooling plug of JPLH, JPL, and LJPL breaking, it can be easily detached due to the presence of a hexagonal hole inside the diameter.

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Guide for Plugs P.1047

HIGH COUPLERS FOR COOLING PIPE

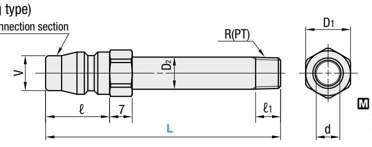
—PLUGS—

Non JIS material definition is listed on P.1351 - 1352

RoHS

LJPLH
(Hexagonal head long type)

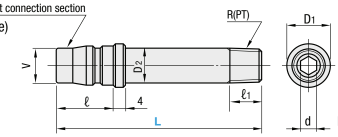
Matching Sockets: P.1053



M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

LJPL
(Hexagonal hole long type)

Matching Sockets: P.1053



Allen wrenching hole on both ends (socket connection and tapered thread parts).
The hex-wrench hole extends to a point mid-way from both ends. It is not fully pierced.

M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

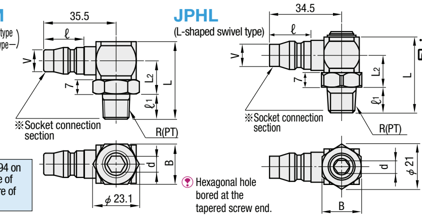
Matching Sockets	Socket connection parts		D1	D2	d	Tapered thread R(PT)	ℓ_1	Part Number		L	
	V	ℓ						Type	No.		
High couplers series Socket hole diameter V=10.9	10.9	20	14	10	6	1/8	9	Hexagonale head, long LJPLH (Brass)	1	100 110 120 130 140 150 200	
				13.2	7.6	1/4	11		2		
	10.9	20	14	10	⌬5	1/8	9	Hexagonale hole, long LJPL (Brass)	1	40~115 (5mm increments)	120~200 (10mm increments)
				13.2		1/4	11		2		

RoHS

JPHLM
(L-shaped swivel type
—Constant flow type—)

JPHL
(L-shaped swivel type)

Matching Sockets: P.1053



Refer to P.1094 on the difference of inner structure of swivel type.

Hexagonal hole bored at the tapered screw end.

• **JPHLM**
M Body: Brass (C3604)
Inner parts: Brass (C2700W)
Fluoric rubber
Fluoric rubber grease

• **JPHL**
M Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	L2	Allen side	Hexagonal wrench	Tapered thread	ℓ_1	Part Number		U/Price
	V	ℓ			B	socket ⌬d	R(PT)		Type	No.	1~9
High couplers series Socket hole dia. V=10.9	10.9	20	35.5	16.5	20	⌬6	1/8	9.5	L-shaped swivel type —Constant flow type— JPHLM (Brass)	1	Quotation
			38.5			⌬8	1/4	12.5		2	
			39.5				3/8	13.5		3	
	10.9	20	36.5	15.75	19	⌬5	1/8	9.5	L-shaped swivel type JPHL (Brass)	1	
			39.5			⌬6	1/4	12.5		2	
			42.5	17.75			3/8	13.5		3	

Matching sockets: MISUMI's high couplers for cooling pipe KHSH • KHSM • KHSF • F120—KHSH • F120—KHSM • F120—KHSF P.1053
Nitto's high couplers □□SH (Ex. 20SH) • □□SM (Ex. K20SM) • □□SF

Matching Joint Plug Connections P.1045 Use in normal pressure 980kPa (10kgf/cm^2) or lower.

Please use JPHL • JPHLM at water temperature of **120**℃ or less.

Order

Part Number		—	L
LJPLH	2	—	100
LJPL	2	—	100
JPHL	2		

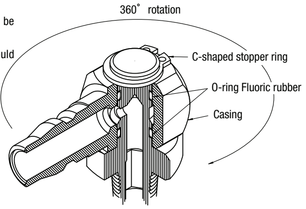
- As for L-Shaped Swivel Plugs, the tube extraction angle can be altered by turning its head after tightening the screw.

Note that intermittent or continuous turning of the head could damage the O-ring, which results in water leakage.

Days to Ship Quotation

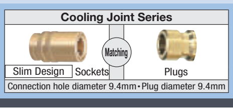
Price Quotation

Example



JOINTS FOR COOLING WATER

—SLIM DESIGN SOCKETS—


Cooling Joint Series
Matching
Slim Design
Sockets
Plugs
Connection hole diameter 9.4mm・Plug diameter 9.4mm

JOINTS FOR COOLING WATER

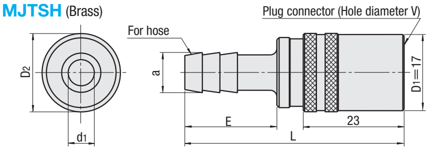
—PLUGS—

Non JIS material definition is listed on P.1351 - 1352

For hose attachment

F120—MJTSH (Brass)

Matching Plugs: P.1058・1059


D2
d1
a
For hose
Plug connector (Hole diameter V)
D1=17
E
23
L

M Brass (C3604)

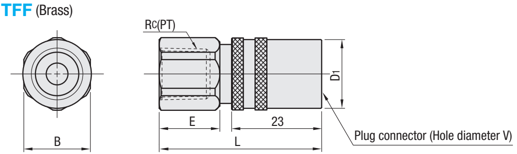
Matching Plug	Plug connection parts		D2	L	d1	For hose		Part Number		U/Price
	Hole diameter V	D1				a	E	Type	No.	1~9
Cooling Joint Plugs Tip diameter V=9.4	9.4	17	17.5	50	6	8.9	21	For hose attachment **F120—MJTSH** (Brass)	2	Quotation
					7	11.5	21		3	

RoHS

For male screw joint

F120—MJTFF (Brass)

Matching Plugs: P.1058・1059


Rc(PT)
D1
E
23
B
L
Plug connector (Hole diameter V)

M Brass (C3604)

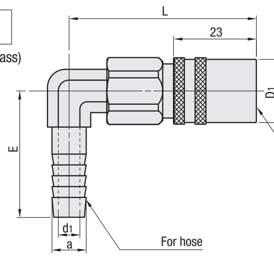
Matching Plug	Plug connection parts		L	E	B	Tapered female thread	Part Number		U/Price
	V	D1				Rc(PT)	Type	No.	1~9
Cooling Joint Plugs Tip diameter V=9.4	9.4	17	41.5	15.5	17	1/4	For male screw joint **F120—MJTFF** (Brass)	2	Quotation

RoHS

For hose attachment L-shaped

F120—MJTSL (Brass)

Matching Plugs: P.1058・1059


L
23
D1
E
d1
a
For hose
Plug connector (Hole diameter V)

M Brass (C3604)
For hose: Brass (C3771)

Matching Plug	Plug connection parts		L (Reference)	d1	For hose		Part Number		U/Price
	V	D1			a	E	Type	No.	1~9
Cooling Joint Plugs Tip diameter V=9.4	9.4	17	(52)	6	9.5	31.5	For hose (L-shaped) **F120—MJTSL** (Brass)	2	Quotation

- Matching plugs: MISUMI's cooling joint plug JPJH・JPJ・LJPJ・LJPJH・JPLJ・JPLJM **P.1058・1059**
- Matching Joint Plug Connections **P.1045**
- Guide for Socket・Plug **P.1047・1048・1317~1320**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Keep water temperature under 120℃.

Order

Part Number
F120—MJTSH2
F120—MJTFF2
F120—MJTSL2

Price Quotation

Days to Ship Quotation

RoHS

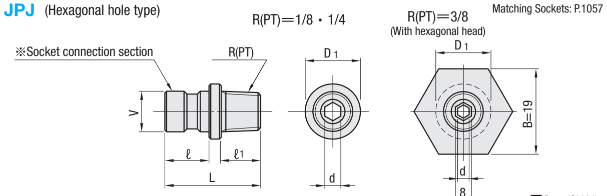
R(PT)=1/8・1/4

RoHS

R(PT)=3/8

JPJ (Hexagonal hole type)

Matching Sockets: P.1057


R(PT)=1/8・1/4
R(PT)=3/8
(With hexagonal head)
※Socket connection section
R(PT)
D1
D1
V
ℓ
ℓ1
L
d
B=19
d
8

Through hexagonal hole for wrenching.

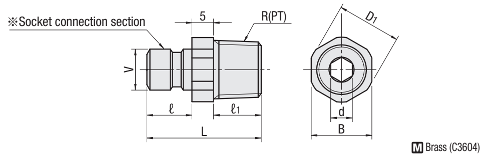
M Brass (C3604)
Thread JIS B0203 Tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
	V	ℓ			B	⬡d	R(PT)		Type	No.	1~9
Cooling Joint Series Socket hole diameter V=9.4	9.4	10.4	22.4	13	—	⬡5	1/8	9	Hexagonal hole type **JPJ** (Brass)	1	Quotation
			24.4	14			1/4	11		2	
		13.4	32.4	13	19		3/8	12		3	

RoHS

JPJH (Hexagonal head・hole type)

Matching Sockets: P.1057


※Socket connection section
5
R(PT)
D1
V
ℓ
ℓ1
L
d
B

M Brass (C3604)
Thread JIS B0203 Tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
	V	ℓ			B	⬡d	R(PT)		Type	No.	1~9
Cooling Joint Series Socket hole diameter V=9.4	9.4	10.4	24.4	(13.5)	12	⬡5	1/8	9	Hexagonal head/hole type **JPJH** (Brass)	1	Quotation
			26.4	(15.5)	14		1/4	11		2	

- Matching Joint Plug Connections **P.1045**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- These plugs are applicable to slim design sockets. **P.1057**
- Guide for Socket・Plug **P.1047・1048・1317~1320**

Order

Part Number
JPJ 2
JPJH 2

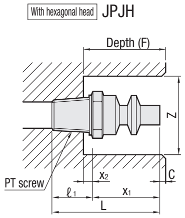
Price Quotation

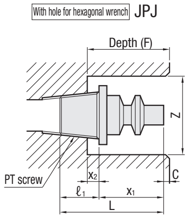
Days to Ship Quotation

Example

Cooling-use Plug (Standard type)							Attachment Hole				
Part Number		Tapered male thread R(PT)	Full length L	Thread length ℓ1	x1	x2 (reference value)	C	Counterbore depth F (reference value)	Z (Counterbore hole diameter)		Tapered female thread Rc(PT)
Type	No.								When using hexagonal wrench	When using socket wrench	
JPJH	1	1/8	24.4	9	15.4	2~4	less than 2mm	15.4+X2	18~	20~	1/8
	2	1/4	26.4	11	15.4	2~4		15.4+X2	18~	23~	1/4
JPJ	1	1/8	22.4	9	13.4	2~4		13.4+X2	18~	—	1/8
	2	1/4	24.2	11	13.4	2~4		13.4+X2	18~	—	1/4
	3	3/8	32.4	12	17.4	3~5		17.4+X2	22~	(29~)	3/8

Please note that C dimension is less than 2mm when combining with Slim design socket.


With hexagonal head
JPJH
Depth (F)
Z
C
PT screw
X2
ℓ1
X1
L


With hole for hexagonal wrench
JPJ
Depth (F)
Z
C
PT screw
X2
ℓ1
X1
L

Notes: 1. Setting C dimension over 2mm will cause the socket to bump on the mold and make attaching/detaching impossible.
2. X2(Reference values) Appropriate dimensions vary depending on the hole diameter as well as the tapping depth and finishing level.
3. Dimensions of JPJ shown in ( ) indicate the diameter of a counterbore for using a JIS B4636 socket wrench.

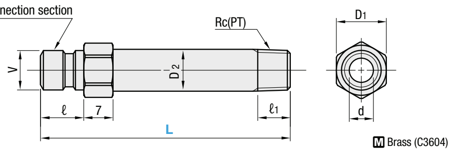
JOINTS FOR COOLING WATER

—PLUGS—

RoHS

LJPJH (Hexagonal head long type)

Matching Sockets: P.1057

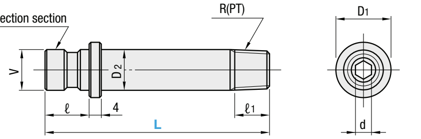


Ⓜ Brass (C3604)

Thread JIS B0203 tapered thread for tubing R(PT)

LJPJ (Hexagonal hole long type)

Matching Sockets: P.1057



- Allen wrenching hole on both ends (socket connection and tapered thread parts). The hex-wrench hole extends to a point mid-way from both ends. It is not fully pierced.

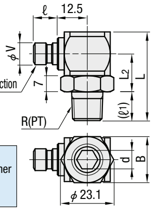
Ⓜ Brass (C3604)

Thread JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts V	Socket connection parts ℓ	D1	D2	d	Tapered thread R(PT)	ℓ1	Part Number Type	Part Number No.	L
Cooling Joint Series Socket hole diameter V=9.4	9.4	10.4	12	10	5.8	1/8	9	Hexagonale head, long LJPJH (Brass)	1	100 110 120 130 140 150 200
			14	13.2		1/4	11		2	
	9.4	10.4	14	10	⬡5	1/8	9	Hexagonale hole, long LJPJ (Brass)	1	40~115 (5mm increments) 120~200 (10mm increments)
				13.2		1/4	11		2	

JPLJM

(L-shaped swivel type — Constant flow type —)

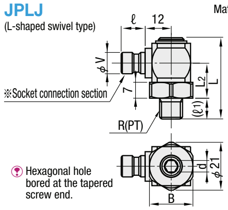


Refer to P.1094 on the difference of inner structure of swivel type.

JPLJ

(L-shaped swivel type)

Matching Sockets: P.1057



- Hexagonal hole bored at the tapered screw end.

- **JPLJM**

Ⓜ Body: Brass (C3604)
Inner parts: Brass (C2700W)
Fluoric rubber
Fluoric rubber grease

- **JPLJ**

Ⓜ Brass (C3604)
Thread JIS B0203
Tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts V	Socket connection parts ℓ	L	L2	Allen side B	Hexagonal wrench socket ⬡d	Tapered thread R(PT)	ℓ1	Part Number Type	Part Number No.	U/Price 1~9
Cooling Joint Series Socket hole diameter V=9.4	9.4	10.4	35.5	16.5	20	⬡6	1/8	9.5	L-shaped swivel type JPLJM (Brass)	1	Quotation
			38.5			⬡8	1/4	12.5		2	
	9.4	10.4	36.5	15.75	19	⬡5	1/8	9.5	L-shaped swivel type JPLJ (Brass)	1	
			39.5			⬡6	1/4	12.5		2	

- Matching Joint Plug Connections ☞ **P.1045**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- These plugs are applicable to slim design sockets. ☞ **P.1057**
- Guide for Socket • Plug ☞ **P.1047**
- Please use JPLJ • JPLJM at water temperature under **120**℃.

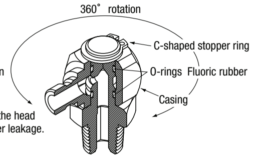
Order

Part Number	—	L
LJPJ 2	—	100
JPLJ 1		

Days to Ship Quotation

Price Quotation

Example

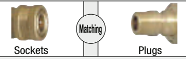


- As for L-Shaped Swivel Plugs, the tube extraction angle can be altered by turning its head after tightening the screw.
- Note that intermittent or continuous turning of the head could damage the O-ring, which results in water leakage.

VALVELESS TSP COUPLERS FOR COOLING

—SOCKETS • PLUGS—

Valveless TSP Coupler Series for Cooling



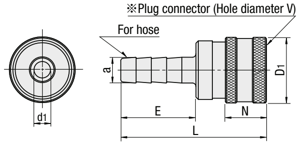
Sockets Plugs

Connect matching the hole diameter with plug diameter.

- Non JIS material definition is listed on P.1351 - 1352
- Use TSP coupler series for cooling matching with the diameter size of socket and plug.

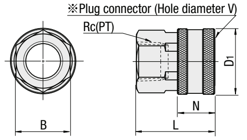
For hose attachment

F120—TSH (Brass)



For male screw joint

F120—TSF (Brass)



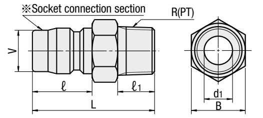
Ⓜ Brass (C3604)

Matching Plug	Plug connection parts Hole diameter V	Plug connection parts N	Plug connection parts D1	F120—TSH L	F120—TSH d1	F120—TSH For hose a	F120—TSH For hose E	F120—TSF L	F120—TSF Allen side B	F120—TSF Tapered female thread Rc(PT)	Part Number Type	Part Number No.	U/Price 1~9
TSP couplers Tip diameter V=11	11	17	24	55	5	8	29	32	19	1/4	F120—TSH (Brass) F120—TSF (Brass)	2	Quotation
TSP couplers Tip diameter V=14	14	17.5	28	62	7	11	32	35	23	3/8		3	
TSP couplers Tip diameter V=19	19	20	35	74	10	15	39	42	29	1/2		4	

- Matching plugs: MISUMI's TSP couplers for cooling F120—TPM (Ex.F120—TPM2) • SF120—TPM • F120—TPF • SF120—TPF ☞ **P.1060 • 1068**
  Nitto's TSP couplers □TPM (Ex.3TPM) • □TPF • □TPH
- Matching Joint Plug Connections ☞ **P.1045**
- Guide for Sockets • Plugs ☞ **P.1047 • 1048 • 1317~1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- For TSP couplers for cooling, there is no automatic open/close valve because it is valveless type. Please confirm the hydraulic pressure and water temperature before removing the socket.

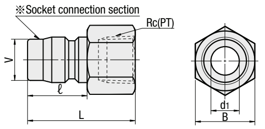
With hexagonal head

F120—TPM (Brass)



For male screw joint

F120—TPF (Brass)



Ⓜ Brass (C3604)

Matching Sockets	Socket connection parts V	Socket connection parts ℓ	Int. Dia. d1	F120—TPM L	F120—TPM Allen side B	F120—TPM Tapered male thread R(PT)	F120—TPM ℓ1	F120—TPF L	F120—TPF Allen side B	F120—TPF Tapered female thread Rc(PT)	Part Number Type	Part Number No.	U/Price 1~9
TSP couplers Tip diameter V=11	11	18	6.5	38	17	1/4	13	34	17	1/4	F120—TPM (Brass) F120—TPF (Brass)	2	Quotation
TSP couplers Tip diameter V=14	14	21	10	43	17	3/8	13	38	21	3/8		3	
TSP couplers Tip diameter V=19	19	24	13	52	22	1/2	17	45	29	1/2		4	

- Matching sockets: MISUMI's TSP couplers for cooling F120—TSH (Ex.F120—TSH3) • SF120—TSH • F120—TSF • SF120—TSF ☞ **P.1060 • 1068**
  Nitto's TSP couplers □TSH (Ex.3TSH) • □TSF • □TSM
- Matching Joint Plug Connections ☞ **P.1045**
- Guide for Sockets • Plugs ☞ **P.1047 • 1048 • 1317~1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- For TSP couplers for cooling, there is no automatic open/close valve because it is valveless type. Please confirm the hydraulic pressure and water temperature before removing the socket.

Order

Part Number
F120—TSH2
F120—TPM2

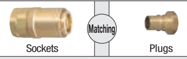
Days to Ship Quotation

Price Quotation

LARGE FLOW MOLD COUPLERS

—SOCKETS • PLUGS—

Large Flow Mold Couplers Series

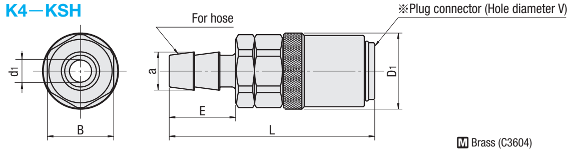


Connect matching the hole diameter with plug diameter.

- Please note that large flow mold coupler is not applicable to normal mold coupler.
- Use large flow mold coupler matching with the diameter size of socket and plug.

For hose attachment

K3—KSH
K4—KSH



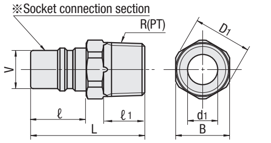
M Brass (C3604)

Matching Plug	Plug connection parts		L	d1	Allen side B	For hose		Part Number		U/Price
	Hole diameter V	D1				a	E	Type	No.	1～9
Tip diameter V=11.5	11.5	24	65	7	21	12	21	K3—KSH	3	Quotation
			67	10		15			4	
Tip diameter V=15.4	15.4	32	82	10	29	15	23	K4—KSH	4	

- Matching plugs: MISUMI's large flow mold couplers K3—KPM (Ex.K3—KPM2) • K4—KPM • K3—JPSH (Ex.K3—JPSH2) ☞ **Below**
  Nitto's large flow mold couplers K3—□□PM (Ex.K3—03PM) • K4—□□PM
- Matching Joint Plug Connections ☞ **P.1045**
- Guide for Sockets • Plugs ☞ **P.1047 • 1048 • 1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Keep water temperature under 80℃.
- Please note that matching plug of K3—KSH is V=11.5 and that of K4—KSH is different by V=15.4.
- Please note that large flow mold coupler is not applicable to normal mold coupler.

Hexagonal head type

K3—KPM
K4—KPM

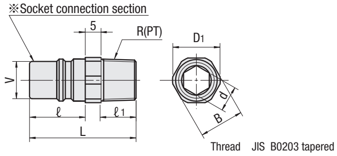


M Brass (C3604)

Thread JIS B0203 tapered thread for tubing R(PT)

Hexagonal head/hole type

K3—JPSH



M Brass (C3604)

Thread JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side B	Inner dia. d1	Hexagonal wrench socket ⬡d	Tapered thread R(PT)	ℓ1	Part Number		U/Price
	V	ℓ								Type	No.	1～9
Hole diameter V=11.5	11.5	17.5	36	15.5	14	9	—	1/4	13	K3—KPM	2	Quotation
				18.5	17			3/8			3	
Hole diameter V=15.4	15.4	21.5	46	24	22	9.5		1/2	17	K4—KPM	4	
Hole diameter V=11.5	11.5	17.5	33.5	15.5	14	—	⬡8	1/4	11	K3—JPSH	2	

- Matching plugs: MISUMI's large flow mold couplers K3—KSH (Ex.K3—KSH3) • K4—KSH ☞ **Above**
  Nitto's large flow mold couplers K3—□□SH (Ex.K3—03SH) • K4—□□SH
- Matching Joint Plug Connections ☞ **P.1045**
- Guide for Sockets • Plugs ☞ **P.1047 • 1048 • 1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Please note that matching sockets of K3—KPM • K3—JPSH is V=11.5 and that of K4—KPM is different by V=15.4.
- Please note that large flow mold coupler is not applicable to normal mold coupler.

Order

Part Number
K3—KSH3
K4—KPM4

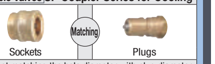
Price **Quotation**

Days to Ship **Quotation**

DOUBLE VALVES SP COUPLERS FOR COOLING

—SOCKETS • PLUGS—

Double Valves SP Coupler Series for Cooling



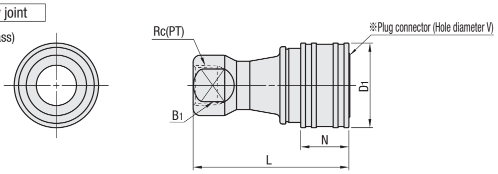
Connect matching the hole diameter with plug diameter.

- Non JIS material definition is listed on P.1351 - 1352
- Use SP coupler series for cooling matching with the diameter size of socket and plug.

RoHS

For male screw joint

F120—SF (Brass)



M Brass (C3604)

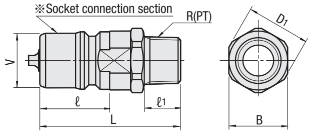
Matching Plug	Plug connection parts			L	Dihedral side B1	Tapered female thread Rc(PT)	Part Number		U/Price
	Hole diameter V	N	D1				Type	No.	1～9
SP couplers Tip diameter V=11	11	15.3	24	48	14	1/8	F120—SF (Brass)	1	Quotation
SP couplers Tip diameter V=14	14	17.5	28	58	19	1/4		2	
SP couplers Tip diameter V=19	19	20	35	65	21	3/8		3	
SP couplers Tip diameter V=23.5	23.5	25.5	45	72	29	1/2		4	

- Matching plugs: MISUMI's SP couplers for cooling F120—PM (Ex.F120—PM2) • SF120—PM • F120—PF (Ex.F120—PF2) • SF120—PF ☞ **Below • P.1067**
  Nitto's SP couplers □P (Ex.3P)
- Matching Joint Plug Connections ☞ **P.1045**
- Guide for Sockets • Plugs ☞ **P.1047 • 1048 • 1317～1320**
- Keep water temperature under 120℃.
- For SP couplers for cooling, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

RoHS

For female screw joint

F120—PM (Brass)



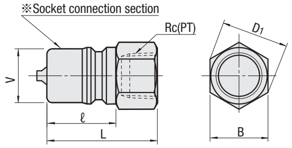
M Brass (C3604)

Matching Sockets	Socket connection parts		L	D1	Allen side B	Tapered male thread R(PT)	ℓ1	Part Number		U/Price
	V	ℓ						Type	No.	1～9
SP couplers Tip diameter V=11	11	19	39.5	15.5	14	1/8	10	F120—PM (Brass)	1	Quotation
SP couplers Tip diameter V=14	14	22	43.5	18.5	17	1/4	13		2	
SP couplers Tip diameter V=19	19	25	50.4	23	21	3/8	13		3	
SP couplers Tip diameter V=23.5	23.5	28	62	32	29	1/2	17		4	

RoHS

For male screw joint

F120—PF (Brass)



M Brass (C3604)

Matching Sockets	Socket connection parts		L	D1	Allen side B	Tapered female thread Rc(PT)	Part Number		U/Price
	V	ℓ					Type	No.	1～9
SP couplers Tip diameter V=14	14	22	36	18.5	17	1/4	F120—PF (Brass)	2	Quotation
SP couplers Tip diameter V=19	19	25	40	23	21	3/8		3	
SP couplers Tip diameter V=23.5	23.5	28	44	32	29	1/2		4	

- Matching sockets: MISUMI's SP couplers for cooling F120—SF (Ex.F120—SF2) • SF120—SF ☞ **Above • P.1067**
  Nitto's SP couplers □S(Ex.2S)
- Matching Joint Plug Connections ☞ **P.1045**
- Guide for Sockets • Plugs ☞ **P.1047 • 1048 • 1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Keep water temperature under 120℃.
- For SP couplers for cooling, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

Order

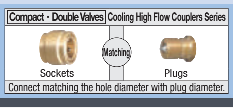
Part Number
F120—SF2
F120—PM2
F120—PF3

Price **Quotation**

Days to Ship **Quotation**

COOLING HIGH FLOW COUPLERS

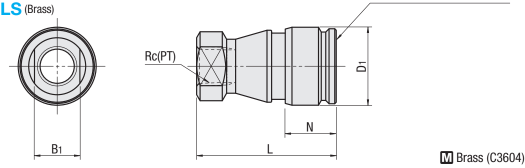
—SOCKETS · PLUGS—


Compact · Double Valves
Cooling High Flow Couplers Series
Sockets
Matching
Plugs
Connect matching the hole diameter with plug diameter.

Use cooling high flow coupler series matching with the diameter size of socket and plug.

For male screw joint

F120—HFLS (Brass)



M Brass (C3604)

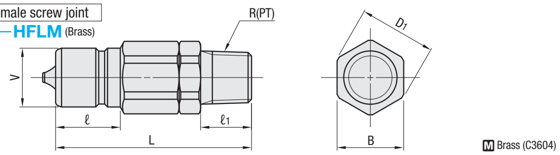
Matching Plugs	Plug connection parts			L	Dihedral side	Tapered female thread	Part Number		U/Price
	Hole diameter V	N	D1		B1	Rc(PT)	Type	No.	1～9
High flow couplers Tip diameter V=15	15	17	26	47	19	1/4	F120—HFLS (Brass)	2	Quotation
High flow couplers Tip diameter V=19	19	18	32	49	24	3/8		3	
High flow couplers Tip diameter V=22	22	21	35	60	29	1/2		4	

- Matching plugs: MISUMI's cooling high flow couplers F120—HFLP (Ex.F120—HFLP2) · SF120—HFLP below · **P.1068**
  Nitto's high flow couplers HFL□P (Ex.HFL2P)
- Use cooling high flow coupler series matching with the diameter size of socket and plug.
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets · Plugs **P.1047 · 1048 · 1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Keep water temperature under 120℃.
- For cooling high flow coupler, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

RoHS

For female screw joint

F120—HFLM (Brass)

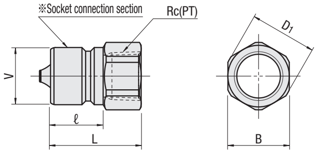


M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	ℓ1	Tapered thread	Part Number		U/Price
	V	ℓ			B		R(PT)	Type	No.	1～9
High flow couplers Tip diameter V=15	15	16.5	50	18.5	17	13	1/4	F120—HFLM (Brass)	2	Quotation
High flow couplers Tip diameter V=19	19	18	54.5	23	21	13	3/8		3	

For male screw joint

F120—HFLP (Brass)



M Brass (C3604)

Matching Sockets	Socket connection parts		L	D1	Allen side	Tapered female thread	Part Number		U/Price
	V	ℓ			B	Rc(PT)	Type	No.	1～9
High flow couplers Tip diameter V=15	15	16.5	30	18.5	17	1/4	F120—HFLP (Brass)	2	Quotation
High flow couplers Tip diameter V=19	19	18	31	23	21	3/8		3	

- Matching Sockets: MISUMI's cooling high flow couplers F120—HFLS (Ex.F120—HFLS2) · SF120—HFLS (Ex.SF120—HFLS2) **Above · P.1068**
  Nitto's high flow couplers HFL□S (Ex.HFL2S)
- Use cooling high flow coupler series matching with the diameter size of socket and plug.
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets · Plugs **P.1047 · 1048 · 1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Keep water temperature under 120℃.
- For cooling high flow coupler, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

Order

Part Number
F120—HFLS2
F120—HFLM2
F120—HFLP4

Price Quotation

Days to Ship Quotation

MOLD COUPLERS／HIGH COUPLERS FOR COOLING PIPE

—PLUGS—

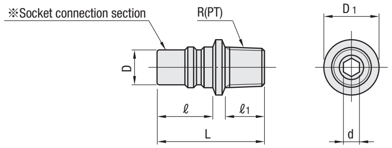
Non JIS material definition is listed on P.1351 - 1352

—Mold Couplers—
(Hexagonal hole type)

RoHS

50 PACK—JPS (50 pieces)
100 PACK—JPS (100 pieces)

Matching Sockets: P.1049



Through hexagonal hole for wrenching.

M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

D	D1	Hexagonal wrench socket ⬡d	L	ℓ	ℓ1	Tapered thread R(PT)	Part Number			U/Price	
							PACK	Type	No.	50 PACK	100 PACK
8	13	⬡5	27	15	9	1/8	50 PACK 100 PACK	JPS	1	Quotation	
	14		29		11	1/4			2		

- Matching Sockets: MISUMI's mold couplers KSH · KTSH · KSM · KTSM · KFF · KTFF · F120—KSH · F120—KSM · F120—KFF · F120—KSHL · F120—KTSHBL **P.1049**
  Nitto's mold couplers K□□SH (Ex.K02SH) · K□□TSH · K□□SM · K□□SF
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Guide for plugs **P.1047 · 1048 · 1317～1320**

Order

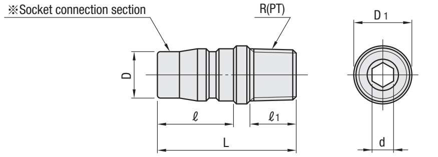
	Part Number		
	PACK	Type	No.
(For 50 pcs.)	50 PACK	— JPS	1
(For 100 pcs.)	100 PACK	— JPS	1

Days to Ship Quotation

—High Couplers for Cooling Pipe—
(Hexagonal hole type)

50 PACK—JPL (50 pieces)
100 PACK—JPL (100 pieces)

Matching Sockets: P.1053 · 1060



Through hexagonal hole for wrenching.

M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

D	D1	Hexagonal wrench socket ⬡d	L	ℓ	ℓ1	Tapered thread R(PT)	Part Number			U/Price	
							PACK	Type	No.	50 PACK	100 PACK
10.9	14	⬡6	32	20	9	1/8	50 PACK 100 PACK	JPL	1	Quotation	
	14		34		11	1/4			2		
	18		37		14	3/8			3		

- Matching sockets: MISUMI's high couplers for cooling pipe KHSH · KHSM · KHSF · F120—KHSH · F120—KHSM · F120—KHSF **P.1053**
  Nitto's high couplers 20S□(Ex.20SH) · 30S□ · 40S□
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Guide for plugs **P.1047 · 1048 · 1317～1320**

Order

	Part Number		
	PACK	Type	No.
(For 50 pcs.)	50 PACK	— JPL	1
(For 100 pcs.)	100 PACK	— JPL	1

Days to Ship Quotation

COUPLERS (STAINLESS STEEL)

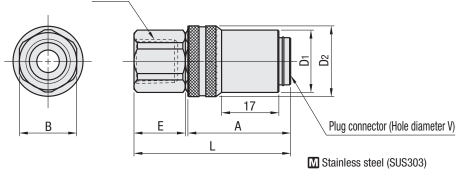
—SOCKETS—

RoHS

For male screw joint

SF120—MFTF
(Stainless steel)

Matching Plugs: SUS—JPSH



M Stainless steel (SUS303)

Matching Plug	Plug connection parts		D2	L	A	E	Allen side	Tapered thread	Part Number		U/Price
	V	D1					B	Rc(PT)	Type	No.	1~9
SUS—JPSH plug tip dia. V=8	8	18.5	21	46.5	27	15.25	17	1/4	SF120—MFTF (Stainless steel)	2	Quotation

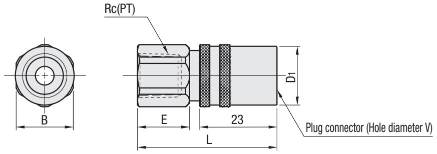
- Matching Plugs: Mold Couplers • Plugs (Stainless Steel) SUS—JPSH **P.1066**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.

RoHS

For male screw joint

SF120—MJTFF
(Stainless steel)

Matching Plugs: SUS—JPJH



M Stainless steel (SUS303)

Matching Plug	Plug connection parts		L	E	Allen side	Tapered female thread	Part Number		U/Price
	V	D1			B	Rc(PT)	Type	No.	1~9
SUS—JPJH plug tip dia. V=9.4	9.4	17.5	41.5	15.5	17	1/4	SF120—MJTFF (Stainless steel)	2	Quotation

- Matching Plugs: Mold Couplers • Plugs (Stainless Steel) SUS—JPJH **P.1066**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.

Order

Part Number
SF120—MFTF2
SF120—MJTFF2

Days to Ship **Quotation**

Price **Quotation**

COUPLERS (STAINLESS STEEL)

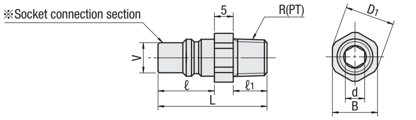
—PLUGS—

- Non JIS material definition is listed on P.1351 - 1352

RoHS

SUS—JPSH(Hexagonal head • hole type)

Matching Sockets: SF120—MFTF



- Through hexagonal hole for wrenching.

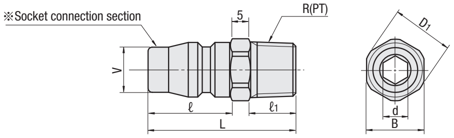
M Stainless Steel (SUS303)
Thread JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
	V	ℓ			B	⬡d	R(PT)		Type	No.	1~9
SF120—MFTF Socket hole diameter V=8	8	15	29	(13.5)	12	⬡5	1/8	9	Hexagonal head/hole type SUS—JPSH (Stainless steel)	1	Quotation
			31	(15.5)	14		1/4	11		2	

- Matching Sockets: Mold Couplers • Sockets (Stainless Steel) SF120—MFTF **P.1065**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

RoHS

SUS—JPLH(Hexagonal head • hole type)



M Stainless Steel (SUS303)
Thread JIS B0203 tapered thread for tubing R(PT)

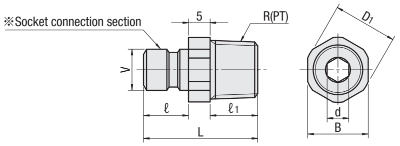
Matching Sockets	Socket connection parts		L	D1	Allen side	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
	V	ℓ			B	⬡d	R(PT)		Type	No.	1~9
SF120—MKHSH Socket hole diameter V=10.9	10.9	20	34	(15.5)	14	⬡6	1/8	9	Hexagonal head/hole type SUS—JPLH (Stainless steel)	1	Quotation
			36				1/4	11		2	

- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

RoHS

SUS—JPJH(Hexagonal head • hole type)

Matching Sockets: SF120—MJTFF



M Stainless Steel (SUS303)
Thread JIS B0203 tapered thread for tubing R(PT)

Matching Sockets	Socket connection parts		L	D1	Allen side	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
	V	ℓ			B	⬡d	R(PT)		Type	No.	1~9
SF120—MJTFF Socket hole diameter V=9.4	9.4	10.4	24.4	(13.5)	12	⬡5	1/8	9	Hexagonal head/hole type SUS—JPJH (Stainless steel)	1	Quotation
			26.4	(15.5)	14		1/4	11		2	

- Matching Sockets: Mold Couplers • Sockets (Stainless Steel) SF120—MJTFF **P.1065**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Order

Part Number
SUS—JPSH2
SUS—JPLH2
SUS—JPJH2

Days to Ship **Quotation**

Price **Quotation**

DOUBLE VALVES SP COUPLERS FOR COOLING

—STAINLESS STEEL SOCKETS・PLUGS—

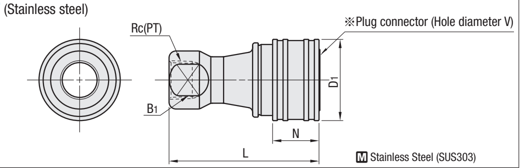
Use SP coupler series for cooling matching with the diameter size of socket and plug.
Please note it's not applicable to combining different sizes.

RoHS

For male screw joint

SF120—SF (Stainless steel)

Matching Plugs: P.1062・1067



M Stainless Steel (SUS303)

Matching Plug	Plug connection parts			L	Dihedral side B1	Tapered female thread Rc(PT)	Part Number		U/Price
	Hole diameter V	N	D1				Type	No.	1～9
SP couplers Tip diameter V=14	14	17.5	28	58	19	1/4	For male screw joint SF120—SF (Stainless steel)	2	Quotation
SP couplers Tip diameter V=19	19	20	35	65	21	3/8		3	
SP couplers Tip diameter V=23.5	23.5	25.5	45	72	29	1/2		4	

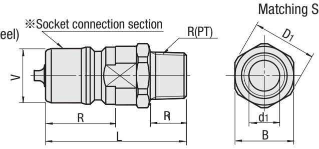
- Matching plugs: MISUMI's SP couplers for cooling F120—PM・F120—PF **P.1062** SF120—PM・SF120—PF **Below**
  Nitto's SP couplers ☐P (Ex.3P)
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Keep water temperature under 120℃.
- For SP couplers for cooling, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

RoHS

Hexagonal head type

SF120—PM (Stainless steel)

Matching Sockets: P.1062・1067



M Stainless Steel (SUS303)

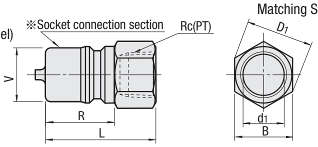
Matching Sockets	Socket connection parts		L	D1	Allen side B	Tapered male thread R(PT)	ℓ1	Part Number		U/Price
	V	ℓ						Type	No.	1～9
SP couplers Tip diameter V=14	14	22	43.5	18.5	17	1/4	13	SF120—PM (Stainless steel)	2	Quotation
SP couplers Tip diameter V=19	19	25	50.4	23	21	3/8	13		3	

RoHS

For male screw joint

SF120—PF (Stainless steel)

Matching Sockets: P.1062・1067



M Stainless Steel (SUS303)

Matching Sockets	Socket connection parts		L	D1	Allen side B	Tapered female thread Rc(PT)	Part Number		U/Price
	V	ℓ					Type	No.	1～9
SP couplers Tip diameter V=14	14	22	36	18.5	17	1/4	SF120—PF (Stainless steel)	2	Quotation
SP couplers Tip diameter V=19	19	25	40	23	21	3/8		3	
SP couplers Tip diameter V=23.5	23.5	28	44	32	29	1/2		4	

- Matching sockets: MISUMI's SP couplers for cooling F120—SF **P.1062** SF120—SF **Above**
  Nitto's SP couplers ☐S (Ex.2S)
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- For SP couplers for cooling, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

Order

Part Number
SF120—SF 2
SF120—PM2
SF120—PF 3

Price Quotation

Days to Ship Quotation

COMPACT・DOUBLE VALVES COOLING HIGH FLOW COUPLERS / VALVELESS TSP COUPLERS FOR COOLING

—STAINLESS STEEL SOCKETS・PLUGS—

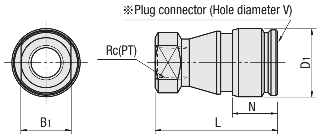
Use cooling high flow coupler series matching with the diameter size of socket and plug.
Please note it's not applicable to combining different sizes.

Non JIS material definition is listed on P.1351 - 1352

RoHS

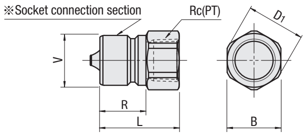
For male screw joint

SF120—HFLS (Stainless steel)



For male screw joint

SF120—HFLP (Stainless steel)



M Stainless Steel (SUS303)

Matching Plug	Plug connection parts			L	Dihedral side B1	Tapered female thread Rc (PT)	Part Number		U/Price
	Hole diameter V	N	D1				Type	No.	1～9
High flow couplers Tip diameter V=15	15	17	26	47	19	1/4	SF120—HFLS (Stainless steel)	2	Quotation
High flow couplers Tip diameter V=19	19	18	32	49	24	3/8		3	

- Matching Plugs: F120—HFLP **P.1063**
- Use cooling high flow coupler series matching with the diameter size of socket and plug.
  Please note it's not applicable to combining different sizes.
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- For cooling high flow coupler, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

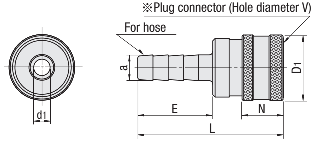
Matching Sockets	Socket connection parts		L	D1	Allen side B	Tapered female thread Rc (PT)	Part Number		U/Price
	V	ℓ					Type	No.	1～9
High flow couplers Tip diameter V=15	15	16.5	30	18.5	17	1/4	SF120—HFLP (Stainless steel)	2	Quotation
High flow couplers Tip diameter V=19	19	18	31	23	21	3/8		3	

- Matching Sockets: F120—HFLS **P.1063**
- Use cooling high flow coupler series matching with the diameter size of socket and plug.
  Please note it's not applicable to combining different sizes.
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- For cooling high flow coupler, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

RoHS

For hose attachment

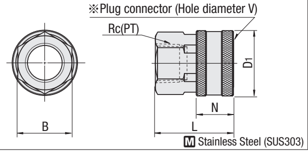
SF120—TSH (Stainless steel)



For male screw joint

SF120—TSF (Stainless steel)

Matching Plugs: SF120—TPM
SF120—TPF



M Stainless Steel (SUS303)

Matching Plug	Plug connection parts			SF120—TSH					SF120—TSF			Part Number		U/Price 1～9	
	Hole diameter V	N	D1	L	d1	Applicable hoses	For hose a	For hose E	L	Allen side B	Tapered female thread Rc (PT)	Type	No.	SF120—TSH	SF120—TSF
TSP couplers Tip diameter V=11	11	17	24	55	5	1/4	8	29	32	19	1/4	SF120—TSH (Stainless steel) SF120—TSF (Stainless steel)	2	Quotation	
TSP couplers Tip diameter V=14	14	17.5	28	62	7	3/8	11	32	35	23	3/8		3		
TSP couplers Tip diameter V=19	19	20	35	74	10	1/2	15	39	42	29	1/2		4		

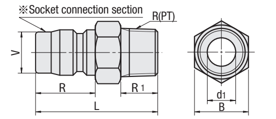
- Matching plugs: **P.1060**
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Keep water temperature under 120℃.

For TSP couplers for cooling, there is no automatic open/close valve because it is valveless type. Please confirm the hydraulic pressure and water temperature before removing the socket.

RoHS

Hexagonal head type

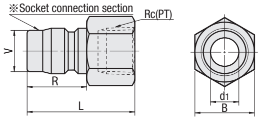
SF120—TPM (Stainless steel)



For male screw joint

SF120—TPF (Stainless steel)

Matching Socket: SF120—TSH
SF120—TSF



M Stainless Steel (SUS303)

Matching Sockets	Socket connection parts		Int. Dia. d1	SF120—TPM				SF120—TPF			Part Number		U/Price 1～9	
	V	ℓ		L	Allen side B	Tapered male thread R(PT)	ℓ1	L	Allen side B	Tapered female thread Rc (PT)	Type	No.	SF120—TPM	SF120—TPF
TSP couplers Tip diameter V=11	11	18	6.5	38	17	1/4	13	34	17	1/4	SF120—TPM (Stainless steel) SF120—TPF (Stainless steel)	2	Quotation	
TSP couplers Tip diameter V=14	14	21	10	43	17	3/8	13	38	21	3/8		3		
TSP couplers Tip diameter V=19	19	24	13	52	22	1/2	17	45	29	1/2		4		

- Matching sockets: **P.1060**
- Matching Joint Plug Connections **P.1045**
- Guide for Sockets・Plugs **P.1047・1048・1317～1320**
- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- For TSP couplers for cooling, there is no automatic open/close valve because it is valveless type. Please confirm the hydraulic pressure and water temperature before removing the socket.

Order

Part Number
SF120—HFLS2
SF120—HFLP2
SF120—TSH 3
SF120—TPM 3

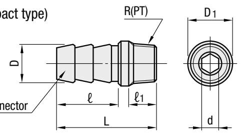
Days to Ship Quotation

Price Quotation

HOSE NIPPLES

—HEXAGONAL HOLE TYPE (FOR HEXAGONAL WRENCH INSTALLATION)—

NPWN (Hexagonal hole type)
NPWNC (Hexagonal hole compact type)



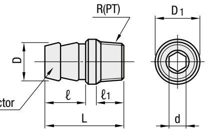
Through hexagonal hole for wrenching.

M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

For hose		D1	L	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
D	ℓ			⬡ d	R(PT)		Type	No.	1~9
12.6	22.5	13	34.5	⬡6	1/8	9	NPWN	1	Quotation
		14	36.5		1/4	11		2	
13.2	27	18	46	⬡8	3/8	15		3	
12.6	22.5	18	40.5	⬡6	3/8	15	NPWNC	3	

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

NPWS (Short type)



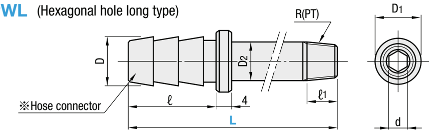
Through hexagonal hole for wrenching.

M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

For hose		D1	L	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
D	ℓ			⬡ d	R(PT)		Type	No.	1~9
12.6	16.5	13	28.5	⬡6	1/8	9	NPWS	1	Quotation
	17.5	14	31.5		1/4	11		2	

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

NPWL (Hexagonal hole long type)



Allen wrenching hole on both ends (nipple and tapered thread parts).
The hex-wrench hole extends to a point mid-way from both ends. It is not fully pierced.

M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

For hose		D1	D2	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		L	U/Price 1~9			
D	ℓ			⬡ d	R(PT)		Type	No.	10mm increments	L50	L60~100	L110~150	L160~200
12.6	22.5	14	10	⬡6	1/8	9	NPWL	1	50~200		Quotation		
			13.2		1/4	11		2					

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Order

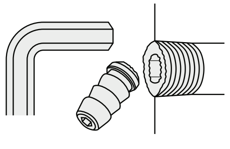
Part Number
NPWN 1
NPWS 2
NPWNC 3

Part Number	—	L
NPWL 2	—	120

Days to Ship Quotation

Price Quotation

Example ● NPWN・NPWNC・NPWS・NPWL・LSNM・LSN



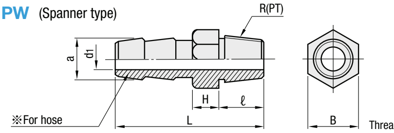
Even if the joint plug is accidentally broken, it can be easily removed as the hole inside shaped hexagonal so that an Allen Wrench fits.

HOSE NIPPLES／L-SHAPED SWIVEL HOSE NIPPLES

—SPANNER TYPE— —HEAT RESISTANT 120℃ TYPE—

Non JIS material definition is listed on P.1351 - 1352

NPW (Spanner type)

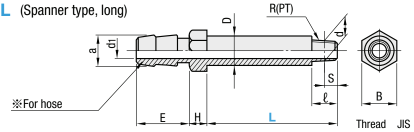


M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

For hose		L	Allen side	H	Tapered thread	ℓ	Part Number		U/Price
a	d1		B		R(PT)		Type	No.	1~9
12	6	38	14	7	1/8	10	NPW	1	Quotation
	8				1/4			2	
15	10	48	17	8	3/8	12		3	

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

NPL (Spanner type, long)



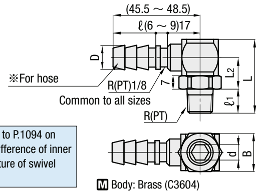
M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

For hose			D	Allen side	H	Tapered thread	ℓ	S	d	Part Number		L	U/Price 1~9		
a	d1	E		B		R(PT)				Type	No.		L50	L100	L150
12	6	21	10.5	14	7	1/8	10	3.97	9.728	NPL	1	50 100 150		Quotation	
	8		13.8			1/4		6.01	13.157		2				
15	10	28	16.8	17	8	3/8	12	6.35	16.662		3				

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

RoHS

LSNM (L-shaped swivel type—Constant flow type—)



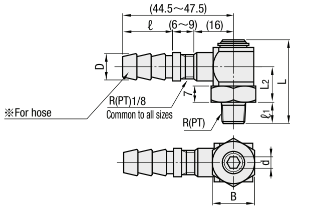
Refer to P.1094 on the difference of inner structure of swivel type.

M Body: Brass (C3604)
Inner parts: Brass (C2700W)
Fluoric rubber Fluoric rubber grease

Values in ( ) are reference only.

Hexagonal hole bored at the tapered screw end.

LSN (L-shaped swivel type)



M Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

For hose		L	L2	Allen side	Hexagonal wrench socket	Tapered thread	ℓ1	Part Number		U/Price
D	ℓ			B	⬡ d	R(PT)		Type	No.	1~9
12.6	22.5	35.5	16.5	20	⬡6	1/8	9.5	LSNM	1	Quotation
		38.5			⬡8	1/4	12.5		2	
		39.5			⬡8	3/8	13.5		3	
		36.5	15.75	19	⬡5	1/8	9.5	LSN	1	
		39.5			⬡6	1/4	12.5		2	
		42.5	17.75		⬡6	3/8	13.5		3	

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower. Keep water temperature under **120**℃.

Order

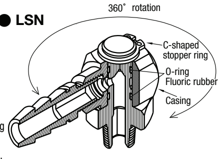
Part Number
NPW 1
LSN 2

Part Number	—	L
NPL1	—	100

Days to Ship Quotation

Price Quotation

Example ● LSN



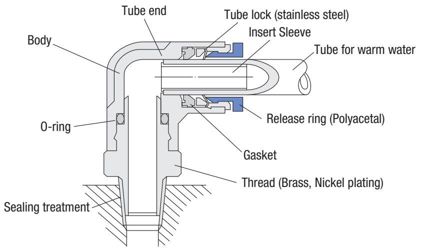
The L-shaped swivel is intended for direction conversion when it is installed on the mold. Note that if you carry out direction conversion continuously by opening and closing the mold, for example, during molding, the O-ring will deteriorate, resulting in water leakage.

GUIDE FOR QUICK-FITTING JOINTS FOR MOLD COOLING

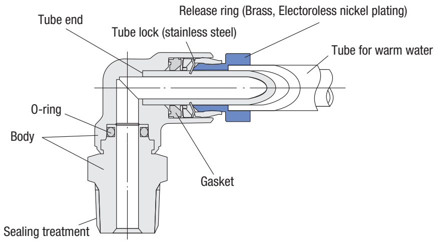
■Quick-fitting Joints —Integrated Plug・Socket—

Structure of L-shaped Joint

Standard (Heat resistant 60℃ series)


Tube end
Tube lock (stainless steel)
Insert Sleeve
Body
Tube for warm water
O-ring
Release ring (Polyacetal)
Gasket
Thread (Brass, Nickel plating)
Sealing treatment

For High Temperature (Heat resistant 99℃ series)


Tube end
Release ring (Brass, Electoroless nickel plating)
Tube lock (stainless steel)
Tube for warm water
O-ring
Body
Gasket
Sealing treatment

Series	Body	O-ring・Gasket	Sealing treatment
Standard heat resistant 60℃ series	Resin (PBT)	Nitrile rubber	Sealing treatment
For High temperature heat resistant 99℃ series	Brass	Heat resistant nitrile rubber	Heat proof sealing

Features

- Allows quick and easy attachment of a tube.
- The L-shaped joint (M-PL, M-PLL, M-POL, M-KL) allows adjustment of tube angles even after installation.

Specifications

Usable fluid	Water (fresh water)	Air
Usable Pressure kPa {kgf/cm²}	0~300 {0~3}	0~900 {0~9}
Usable Temperature Range ℃	Standard heat resistant 60℃ series 0~60 For High temperature heat resistant 99℃ series 0~99	

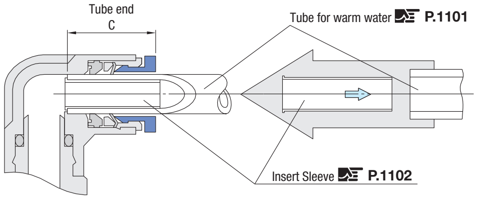
Tube/Insert Sleeve Installation/Removal

①Attaching tubes (with insert sleeves):

- Check if the tube end is squarely cut (in the right angle), and it is not damaged or deformed.
- Make sure to use an insert sleeve to prevent the tube from coming off or leaking.
- Insert the tube fully up to the tube end (C dimension).
(Please refer to specifications for each product for C dimension details.)
- Lightly pull the tube to make sure that it will not come out.

②Detaching the tube:

- Push the tube release ring evenly, and pull the tube toward you.
- (Pushing the release ring unlocks the tube lock.)


Tube end
C
Tube for warm water P.1101
Insert Sleeve P.1102

Notes

Standard heat resistant 60℃ series | For High temperature heat resistant 99℃ series

- Before removing the plug, make sure to check that the pressure inside the tube has come down to zero and the temperature of the fluid (water) to below 30℃.
- Do not touch the plug's release sleeve when the pressure is turned on.
- Keep the quick-fitting mold joint free of load (such as tension, torsion and bending) to protect it from damage.
- Do not apply percussion flow (water hammer) to the joint.
- Make sure to use an insert sleeve to prevent the tube from coming off or leaking.

■Quick-fitting Joints —Separate Plug・Socket— For High Temperature (Heat resistant 99℃ series)

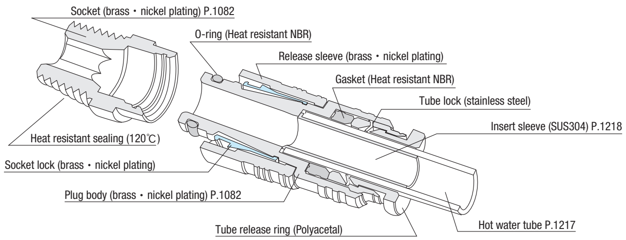
Features

- Allows quick and easy attachment/detachment of a plug (joint part), socket (thread part) and tubes.
- Keeps the mold clear of any protruding socket parts once the plug is pulled out.
- Allows use of heat transfer medium, water (fresh water) and air as fluid.
- The thread part is applied with heat resistant sealing, eliminating the need for sealing tape, etc. (This sealing remains effective for 2 or 3 times of installation; use sealing tape, etc. for subsequent usage.)

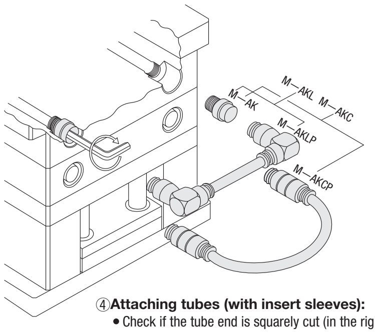
Specifications

Usable fluid	Water (fresh water)	Air
Usable Pressure kPa {kgf/cm²}	0~300 {0~3}	0~900 {0~9}
Usable Temperature Range ℃	0~99	0~99

Component Drawing

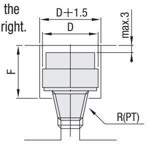

Socket (brass・nickel plating) P.1082
O-ring (Heat resistant NBR)
Release sleeve (brass・nickel plating)
Gasket (Heat resistant NBR)
Tube lock (stainless steel)
Insert sleeve (SUS304) P.1218
Heat resistant sealing (120℃)
Socket lock (brass・nickel plating)
Plug body (brass・nickel plating) P.1082
Tube release ring (Polyacetal)
Hot water tube P.1217

Installation Example


M–AK
M–AKL
M–AKC
M–AKLP
M–AKCP

①Preparing socket holes:

Make holes on the mold in accordance with the socket size as shown in the drawing on the right.


D+1.5
D
max.3
F
R(PT)

②Installing the socket:

Install the sockets into the mold using the allen wrenching hole provided on each piece.

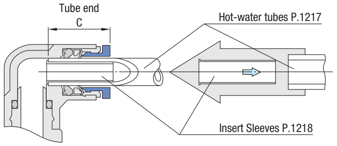
Part Number	Tapered thread R(PT)	D	Counterbore depth F	Tightening torque N・cm {kgf・cm}
M–AK08–01S	1/8	15	14.5	686~ 882 { 70~ 90}
M–AK08–02S	1/4		14	1176~1372 {120~140}
M–AK10–01S	1/8	18	17	686~ 882 { 70~ 90}
M–AK10–02S	1/4			1176~1372 {120~140}
M–AK10–03S	3/8		16.5	2157~2353 {220~240}

③Attaching the plug:

Push the plug into the socket until it firmly sits.
Lightly pull the plug to make sure that it is not loose.
If the plug is not firmly attached, it may unexpectedly come out or cause water leakage.

④Attaching tubes (with insert sleeves):

- Check if the tube end is squarely cut (in the right angle), and it is not damaged or deformed.
- Make sure to use an insert sleeve to prevent the tube from coming off or leaking.
- Insert the tube fully up to the tube end (C dimension).
- Lightly pull the tube to make sure that it will not come out.

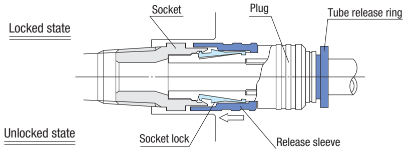

Tube end
C
Hot-water tubes P.1217
Insert Sleeves P.1218

(reference value)

Tube size (external diameter)	ϕ6	ϕ8	ϕ10	ϕ12
C [mm]	17	18.5	21	23.5

Some of the standard type quick-fitting mold joints have a C dimension that is different from the above. Refer to the catalog page concerned for the actual size.

How to Detach


Locked state
Socket
Plug
Tube release ring
Unlocked state
Socket lock
Release sleeve

①Detaching the plug:

While pressing down the release sleeve on the socket, pull the plug to extract it. (Pressing down the release sleeve unlocks the socket lock.)

②Detaching the tube:

Push the tube release ring evenly, and pull the tube toward you. (Pushing the release ring unlocks the tube lock.)

QUICK-FITTING JOINTS FOR MOLD COOLING—INTEGRATED PLUG・SOCKET—

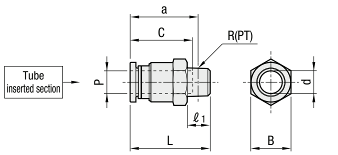
—STANDARD TYPE (HEAT RESISTANT 60℃ SERIES)—

Specifications for M—PC, M—PCX, M—POC have been changed from January 2015 on, according to manufacturer specifications. The switchover will take place sequentially as stock runs out.

Non JIS material definition is listed on P.1351 - 1352

RoHS

M—PC (Straight Joint Plug—Spanner type)

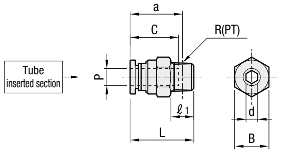


M Body: Brass (C3604)＋Nickel plating
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)＋Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—PC is made in integral structure,and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		d	L	a	Allen side	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C				B			Type	No.	1～19
4×2.5	4	14.9	3	21.0	17.0	10	8	1/8	M—PC	4—01	Quotation
				22.5	16.5	14	11	1/4		4—02	
6×4	6	17	5	22.3	18.3	12	8	1/8		6—01	
				23.7	17.6	14	11	1/4		6—02	
				24.5	18.1	17	12	3/8		6—03	
8×6	8	18.2	6	27.9	23.9	14	8	1/8		8—01	
			7	26.6	20.6		11	1/4		8—02	
				25.5	19.2	17	12	3/8		8—03	
10×7.5	10	20.7	6	30.3	26.3		8	1/8		10—01	
			8.5	29.8	23.8		11	1/4		10—02	
			9	29.3	23.0		12	3/8		10—03	
12×9	12	23.3	8.5	35.9	29.9	21	11	1/4		12—02	
			11	31.9	25.6		12	3/8		12—03	

M—PCX (Straight Joint Plug—Spanner type)



M Body: Brass (C3604)＋Nickel plating
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)＋Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—PCX is made in integral structure, and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		Hexagonal wrench socket	L	a	Allen side	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole diameter P	Depth C	⬡d			B			Type	No.	1～19
4×2.5	4	14.9	⬡2.5	21.0	17.0	10	8	1/8	M—PCX	4—01H	Quotation
6×4	6	17	⬡4	22.3	18.3	12				6—01H	
				23.7	17.6	14	11	1/4		6—02H	
8×6	8	18.2	⬡5	27.9	23.9		8	1/8		8—01H	
			⬡6	26.6	20.6		11	1/4		8—02H	

Order

Part Number
M—PC4 —01
M—PCX6—01H

Days to Ship Quotation

Price Quotation

Package Products

Guide of package sales
With this bulk sales service, you can save.

Part Number			Package price	
PACK	Type	No.	50 PACK (contains 50pcs.)	100 PACK (contains 100pcs.)
50PACK 100PACK	M—PC	6—01	Quotation	
		6—02		
		8—01		
		8—02		
		10—01		
		10—02		

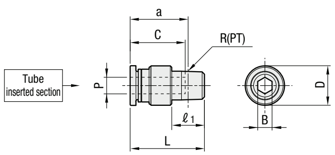
Part Number			Package price	
PACK	Type	No.	30 PACK (contains 30pcs.)	50 PACK (contains 50pcs.)
30PACK 50PACK	M—PCX	4—01H	Quotation	
		6—01H		
		6—02H		
		8—01H		
		8—02H		

Order

Part Number		
PACK	Type	No.
50 PACK—M—PC		6—01
30 PACK—M—PCX		4—01H

Days to Ship Quotation

M—POC (Straight Joint Plug—Hexagonal wrench type)



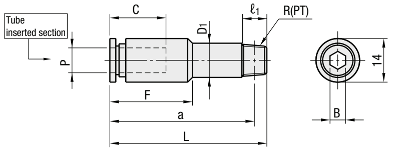
M Body: Brass (C3604)＋Nickel plating
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)＋Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—POC is made in integral structure, and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		D	Hexagonal wrench socket	L	a	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C		⬡B					Type	No.	1～19
4×2.5	4	14.9	9.7	⬡2.5	20.0	16.0	8	1/8	M—POC	4—01	Quotation
6×4	6	17	11.8	⬡4	22.1	18.1				6—01	
			13.7		21.3	15.2	11	1/4		6—02	
8×6	8	18.2	13.7	⬡5	25.9	21.9	8	1/8		8—01	
				⬡6	25.1	19.1	11	1/4		8—02	
			16.8		22.2	15.9	12	3/8		8—03	
10×7.5	10	20.7	17.5		29.8	23.8	11	1/4		10—02	
					29.3	23.0	12	3/8		10—03	
12×9	12	23.3	20.8	⬡8	31.9	25.6				12—03	

RoHS

M—POCL (Long Straight Joint Plug—Hexagonal wrench type)



M Body: Brass (C3604)＋Nickel plating
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)＋Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—POCL is made in integral structure, and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		Hexagonal wrench socket	D1	L	a	F	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C	⬡B							Type	No.	1～19
8×6	8	18	⬡5 Hole depth 12mm from tapered screw	11	48.5	44.5	26.5	8	1/8	M—POCL	8—01—L 40	Quotation
					58.5	54.5					8—01—L 50	
					68.5	64.5					8—01—L 60	
					78.5	74.5					8—01—L 70	
					88.5	84.5					8—01—L 80	
					98.5	94.5					8—01—L 90	
					108.5	104.5					8—01—L100	
					118.5	114.5					8—01—L110	
				14	58.5	52.5	—	11	1/4		8—02—L 50	
					68.5	62.5					8—02—L 60	
					78.5	72.5					8—02—L 70	
					88.5	82.5					8—02—L 80	

Order

Part Number
M—POC 6—02
M—POCL8—01—L40

Days to Ship Quotation

Price Quotation

Package Products

Guide of package sales
With this bulk sales service, you can save.

Part Number			Package price	
PACK	Type	No.	30 PACK (contains 30pcs.)	50 PACK (contains 50pcs.)
30PACK 50PACK	M—POC	4—01	Quotation	
		6—01		
		6—02		
		8—01		
		8—02		
		8—03		
		10—02		
		10—03		
		12—03		

Part Number			Package price	
PACK	Type	No.	30 PACK (contains 30pcs.)	50 PACK (contains 50pcs.)
30PACK 50PACK	M—POCL	8—01—L 40	Quotation	
		8—01—L 50		
		8—01—L 60		
		8—01—L 70		
		8—01—L 80		
		8—01—L 90		
		8—01—L100		
		8—01—L110		
		8—02—L 50		
		8—02—L 60		
		8—02—L 70		
		8—02—L 80		

Order

Part Number		
PACK	Type	No.
30 PACK—M—POC		4—01
30 PACK—M—POCL		8—01—L40

Days to Ship Quotation

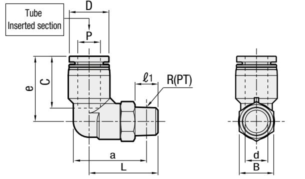
QUICK-FITTING JOINTS FOR MOLD COOLING —INTEGRATED PLUG・SOCKET—

—STANDARD TYPE (HEAT RESISTANT 60℃ SERIES)—

Specifications for M—PL, M—PLL have been changed from January 2015 on, according to manufacturer specifications. The switchover will take place sequentially as stock runs out.

RoHS

M—PL (L-shaped Joint—Spanner type)



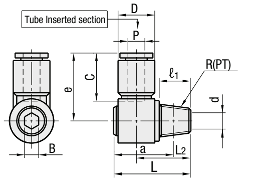
M Body: Polybutylene terephthalate resin (PBT)
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)+Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—PL is made in integral structure, and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		D	d	L	a	e	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C									Type	No.	1～19
4×2.5	4	14.9	10	2.8	22.0	23.0	18.7	10	8	1/8	M—PL	4—01	Quotation
					29.0	28.0	20.7	14	11	1/4		4—02	
6×4	6	17	12.5	4.3	22.5	24.8	20.3	10	8	1/8		6—01	
					28.0	28.2	21.8	14	11	1/4		6—02	
					31.5	29.7	23.8	17	12	3/8		6—03	
8×6	8	18.1	14.5	6	24.0	27.3	22.7	12	8	1/8		8—01	
				6.7	28.0	29.3	23.7	14	11	1/4		8—02	
					31.0	31.9	24.7	17	12	3/8		8—03	
10×7.5	10	20.2	17.5	6	25.0	29.8	25.5	12	8	1/8		10—01	
				8	28.5	31.3	26.0	14	11	1/4		10—02	
				8.3	32.0	34.4	27.0	17	12	3/8		10—03	
12×9	12	23.4	21	8	29.8	34.3	29.3	14	11	1/4		12—02	
				10	32.5	36.7	30.0	17	12	3/8		12—03	

RoHS

M—POL (L-shaped Joint—Hexagonal wrench type)

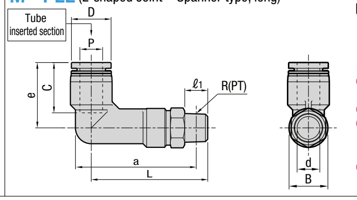


M Body: Polybutylene terephthalate resin (PBT)
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)+Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—POL is made in integral structure, and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		Hexagonal wrench socket	D	d	L	L2	a	e	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C	⬡ B									Type	No.	1～19
6×4	6	17	⬡ 5	13	4.6	24	15.4	20	24	8	1/8	M—POL	6—01	Quotation
						27	18.4	21		11	1/4		6—02	
8×6	8	18	⬡ 8	14	6	27	15.9	23	27	8	1/8		8—01	
						30	18.9	24		11	1/4		8—02	
						31	19.9	24.7		12	3/8		8—03	
10×7.5	10	20	⬡10	18	8	34	20.9	28	31	11	1/4		10—02	
						35	21.9	28.7		12	3/8		10—03	
12×9	12	23.5	⬡12	21	10	39	23.9	32.7	37	12	3/8		12—03	

M—PLL (L-shaped Joint—Spanner type, long)



M Body: Polybutylene terephthalate resin (PBT)
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)+Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

- M—PLL is made in integral structure, and cannot be disassembled.
- Keep water temperature under 60℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		D	d	L	a	e	Allen side B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C									Type	No.	1～19
6×4	6	17	12.5	4.3	37.0	39.3	20.3	10	8	1/8	M—PLL	6—01	Quotation
8×6	8	18.1	14.5	6	40.5	43.8	22.7	12	8	1/8		8—01	
				6.7	44.5	45.7	23.7	14	11	1/4		8—02	
10×7.5	10	20.2	17.5	8	48.0	50.7	26.0	14	11	1/4		10—02	
				8.3	51.5	53.9	27.0	17	12	3/8		10—03	
12×9	12	23.4	21	8	52.8	57.2	29.0	14	11	1/4		12—02	
				10	55.5	59.7	29.7	17	12	3/8		12—03	

☎ Order

Part Number
M—PL 10—03
M—POL6—01
M—PLL 4—01

Days to Ship **Quotation**

P Price **Quotation**

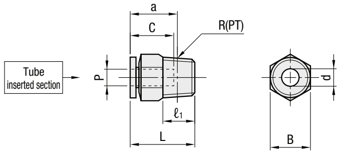
QUICK-FITTING JOINTS FOR MOLD COOLING —INTEGRATED PLUG・SOCKET—

—FOR WARM WATER (HEAT RESISTANT 80℃ SERIES)—

Non JIS material definition is listed on P.1351 - 1352

RoHS

M—80PC (Straight Joint Plug—Spanner type)

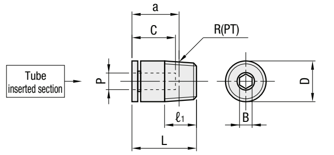


M Body: Brass (C3604)+Nickel plating
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)+Nickel plating
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.

- M—80PC is made in integral structure, and cannot be disassembled.
- Keep water temperature under 80℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		d	L	a	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C							Type	No.	1～19
6×4	6	17	4.6	22.6	18.6	12	8	1/8	M—80PC	6—01F	Quotation
				24.6	18.5	14	11	1/4		6—02F	
8×6	8	18.5	6	27.9	23.9		8	1/8		8—01F	
			7	26.6	20.6		11	1/4		8—02F	
				23.9	17.6	17	12	3/8		8—03F	
10×7.5	10	21	8.5	29.8	23.8		11	1/4		10—02F	
				29.3	23		12	3/8		10—03F	

M—80POC (Straight Joint Plug—Hexagonal wrench type)



M Body: Brass (C3604)+Nickel plating
Release ring: Polyacetal resin (POM)
Thread: Brass (C3604)+Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.

- M—80POC is made in integral structure, and cannot be disassembled.
- Keep water temperature under 80℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (1 MPa).
- Be sure to use an insert sleeve (P.1108) when using this socket.

Matching tubes	Tube inserting hole		D	Hexagonal wrench socket	L	a	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C		⬡ B					Type	No.	1～19
6×4	6	17	12	⬡ 4	22.6	18.6	8	1/8	M—80POC	6—01F	Quotation
			14			16.5	11	1/4		6—02F	
8×6	8	18.5		⬡ 5	27.9	23.9	8	1/8		8—01F	
				⬡ 6	26.6	20.6	11	1/4		8—02F	
			17		23.9	17.6	12	3/8		8—03F	
10×7.5	10	20.5	18		29.8	23.8	11	1/4		10—02F	
					29.3	23	12	3/8		10—03F	

☎ Order

Part Number
M—80PC 8—02F
M—80POC 6—02F

Days to Ship **Quotation**

P Price **Quotation**

Package Products

Guide of package sales
With this bulk sales service, you can save.

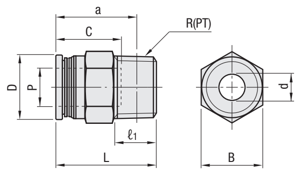
Part Number			Package price	
PACK	Type	No.	50 PACK (contains 50pcs.)	100 PACK (contains 100pcs.)
50PACK 100PACK	M—PL	6—01	Quotation	
		6—02		
		8—01		
		8—02		
		10—01		
		10—02		

Part Number			Package price	
PACK	Type	No.	30 PACK (contains 30pcs.)	50 PACK (contains 50pcs.)
30PACK 50PACK	M—POL	6—01	Quotation	
		6—02		
		8—01		
		8—02		
		8—03		
		10—02		
		10—03		
		12—03		
30PACK 50PACK	M—PLL	6—01		
		8—01		
		8—02		
		10—02		
		10—03		
		12—02		
		12—03		

Part Number			Package price			
PACK	Type	No.	30PACK—M—80PC (contains 30pcs.)	50PACK—M—80PC (contains 50pcs.)	30PACK—M—80POC (contains 30pcs.)	50PACK—M—80POC (contains 50pcs.)
30PACK 50PACK	M—80PC M—80POC	6—01F	Quotation			
		6—02F				
		8—01F				
		8—02F				
		8—03F				
		10—02F				
		10—03F				

QUICK-FITTING JOINTS FOR MOLD COOLING—INTEGRATED PLUG・SOCKET—
—FOR HIGH TEMPERATURE TYPE (HEAT RESISTANT 99℃ SERIES)—

RoHS **M—KC**

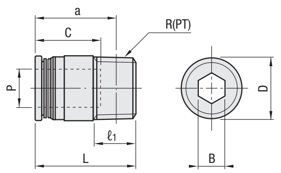


M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.

- M—KC is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

Matching tubes	Tube inserting hole		D	d	L	a	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C								Type	No.	1～19
4×2.5	4	14.5	9.4	2.5	20.6	16.6	10	8	1/8	M—KC	4—01—1	Quotation
6×4	6	16.6	11.4	4	22.2	18.2	12				6—01—1	
					26.2	20.1	14	11	1/4		6—02—1	
8×6	8	17.7	13.4	6	27.4	23.4		8	1/8		8—01—1	
					26.1	20.1		11	1/4		8—02—1	
10×7.5	10	20	16.4		30.1	26.1	17	8	1/8		10—01—1	
				8		24.1		11	1/4		10—02—1	
					28.6	22.3		12	3/8		10—03—1	
12×9	12	22.6	19.4	8.5	35.2	29.2	21	11	1/4		12—02—1	
				9	31.2	24.9		12	3/8		12—03—1	

RoHS **M—KOC**



M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.

- M—KOC is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

Matching tubes	Tube inserting hole		D	L	a	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C							Type	No.	1～19
4×2.5	4	14.5	9.9	20.6	16.6	2.5	8	1/8	M—KOC	4—01—1	Quotation
6×4	6	16.6	11.9	22.2	18.2	4				6—01—1	
8×6	8	17.7	13.9	27.4	23.4	5				8—01—1	
				26.1	20.1	6	11	1/4		8—02—1	
10×7.5	10	20	16.9	30.1	26.1	5	8	1/8		10—01—1	
				29.1	23.1	6	11	1/4		10—02—1	
				28.6	22.3		12	3/8		10—03—1	
12×9	12	22.6	20.8	31.2	24.9	8				12—03—1	

Order
Part Number
M—KC8 —01—1
M—KOC6—01—1

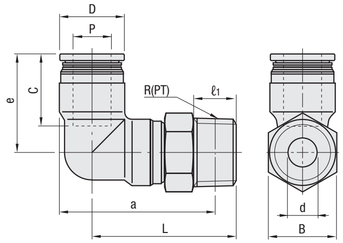
Days to Ship Quotation

Price Quotation

QUICK-FITTING JOINTS FOR MOLD COOLING—INTEGRATED PLUG・SOCKET—
—FOR HIGH TEMPERATURE TYPE (HEAT RESISTANT 99℃ SERIES) L-SHAPED TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS **M—KL**

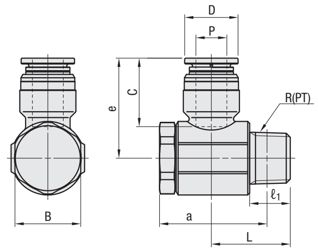


M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.

- M—KL is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

Matching tubes	Tube inserting hole		D	d	L	a	e	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C									Type	No.	1～19
4×2.5	4	14.5	10.5	2.5	22.8	24.1	17.6	10	8	1/8	M—KL	4—01—1	Quotation
6×4	6	16.5	12.5	4	25	27.3	20.1	12				6—01—1	
8×6	8	17.7	14.5	6	28	31.3	22.3	14				8—01—1	
					31	32.2			11	1/4		8—02—1	
10×7.5	10	20	18.5		32.5	37.8	26.1	17	8	1/8		10—01—1	
				8	35.5	38.7			11	1/4		10—02—1	
					36.5	39.4			12	3/8		10—03—1	
12×9	12	22.6	21.5		37.5	42.2	29.7	21	11	1/4		12—02—1	
				9	38.5	42.9			12	3/8		12—03—1	

RoHS **M—KH**



M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.

- M—KH is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

Matching tubes	Tube inserting hole		D	Allen side B	L	a	e	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C								Type	No.	1～19
6×4	6	16.5	12.5	14	15.6	23.8	23.2	8	1/8	M—KH	6—01—1	Quotation
8×6	8	17.7	14.5	14	15.6	23.8	24.4	8	1/8		8—01—1	
				17	20.4	28.3	25.9	11	1/4		8—02—1	
10×7.5	10	20	18.5	17	20.4	28.3	28	11	1/4		10—02—1	
12×9	12	22.6	21.5	21	23.1	32.4	32.4	12	3/8		12—03—1	

Order
Part Number
M—KL4—01—1
M—KH6—01—1

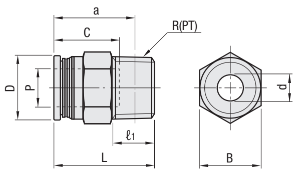
Days to Ship Quotation

Price Quotation

QUICK-FITTING JOINTS FOR MOLD COOLING—INTEGRATED PLUG・SOCKET—
—FOR HIGH TEMPERATURE TYPE (HEAT RESISTANT 120℃ SERIES)—

Non JIS material definition is listed on P.1351 - 1352

RoHS M—120KC

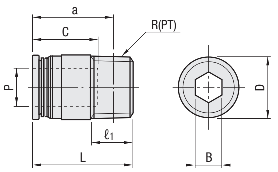


M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.
Seal rubber: Fluoric rubber

- M—120KC is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- The exterior of M—120KC is similar to M—KC, so distinguish them from each other by observing the color of the rubber on the inside of the tube insertion hole. (M—120KC uses green rubber, and M—KC uses black rubber.)
- Be sure to use an insert sleeve (P.1102) when using M—120KC.
- Keep water temperature under 120℃.

Matching tubes	Tube inserting hole		D	d	L	a	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C								Type	No.	1～19
6×4	6	16.6	11.4	4	22.2	18.2	12	8	1/8	M—120KC	6—01—1—F	Quotation
8×6	8	17.7	13.4	6	27.4	23.4	14				8—01—1—F	
					26.1	20.1		11	1/4		8—02—1—F	
10×7.5	10	20	16.4		30.1	26.1	17	8	1/8		10—01—1—F	
				8		24.1		11	1/4		10—02—1—F	
					28.6	22.3		12	3/8		10—03—1—F	
12×9	12	22.6	19.4	8.5	35.2	29.2	21	11	1/4		12—02—1—F	
				9	31.2	24.9		12	3/8		12—03—1—F	

RoHS M—120KOC



M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.
Seal rubber: Fluoric rubber

- M—120KOC is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- The exterior of M—120KOC is similar to M—KOC, so distinguish them from each other by observing the color of the rubber on the inside of the tube insertion hole. (M—120KOC uses green rubber, and M—KOC uses black rubber.)
- Be sure to use an insert sleeve (P.1102) when using M—120KOC.
- Keep water temperature under 120℃.

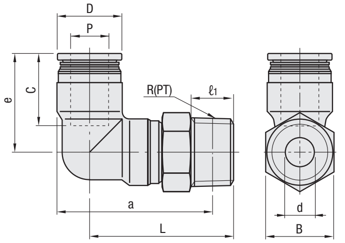
Matching tubes	Tube inserting hole		D	L	a	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C							Type	No.	1～19
6×4	6	16.6	11.9	22.2	18.2	4	8	1/8	M—120KOC	6—01—1—F	Quotation
8×6	8	17.7	13.9	27.4	23.4	5				8—01—1—F	
				26.1	20.1	6	11	1/4		8—02—1—F	
10×7.5	10	20	16.9	29.1	23.1					10—02—1—F	
12×9	12	22.6	20.8	31.2	24.9	8	12	3/8		12—03—1—F	

Order **Part Number**
M—120KC8 —01—1—F
M—120KOC6—01—1—F

Days to Ship **Quotation**

Price **Quotation**

RoHS M—120KL



M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.
Seal rubber: Fluoric rubber

- M—120KL is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm2) or lower.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- The exterior of M—120KL is similar to M—KL, so distinguish them from each other by observing the color of the rubber on the inside of the tube insertion hole. (M—120KL uses green rubber, and M—KL uses black rubber.)
- Be sure to use an insert sleeve (P.1102) when using M—120KL.
- Keep water temperature under 120℃.

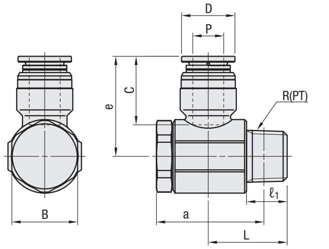
Matching tubes	Tube inserting hole		D	d	L	a	e	B	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C									Type	No.	1～19
6×4	6	16.5	12.5	4	25	27.3	20.1	12	8	1/8	M—120KL	6—01—1—F	Quotation
8×6	8	17.7	14.5	6	28	31.3	22.3	14				8—01—1—F	
					31	32.2			11	1/4		8—02—1—F	
10×7.5	10	20	18.5	8	35.5	38.7	26.1	17				10—02—1—F	
					36.5	39.4			12	3/8		10—03—1—F	
12×9	12	22.6	21.5		37.5	42.2	29.7	21	11	1/4		12—02—1—F	
				9	38.5	42.9			12	3/8		12—03—1—F	

Order **Part Number**
M—120KL6—01—1—F

Days to Ship **Quotation**

Price **Quotation**

RoHS M—120KH



M Body: Brass (C3604)＋Electroless Nickel plating
Release ring: Brass (C3604)＋Electroless Nickel plating
Thread: Brass (C3604)＋Electroless Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
※Thread part is applied with heat resistant sealant.
Seal rubber: Fluoric rubber

- M—120KH is made in integral structure, and cannot be disassembled.
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

Matching tubes	Tube inserting hole		D	Allen side B	L	a	e	ℓ1	R(PT)	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C								Type	No.	1～19
6×4	6	16.5	12.5	14	15.6	23.8	23.2	8	1/8	M—120KH	6—01—1	Quotation
8×6	8	17.7	14.5	14	15.6	23.8	24.4	8	1/8		8—01—1	
				17	20.4	28.3	25.9	11	1/4		8—02—1	
10×7.5	10	20	18.5	17	20.4	28.3	28	11	1/4		10—02—1	
12×9	12	22.6	21.5	21	23.1	32.4	32.4	12	3/8		12—03—1	

Order **Part Number**
M—120KH6—01—1

Days to Ship **Quotation**

Price **Quotation**

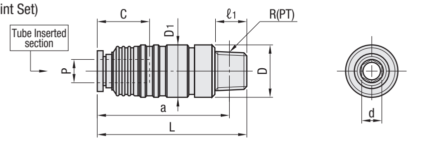
QUICK-FITTING JOINTS FOR MOLD COOLING —SEPARATE PLUG・SOCKET—
—FOR HIGH TEMPERATURE TYPE (HEAT RESISTANT 99℃ SERIES)—

Non JIS material definition is listed on P.1351 - 1352

■Set Products

RoHS

M—AKC
(Straight Joint Set)



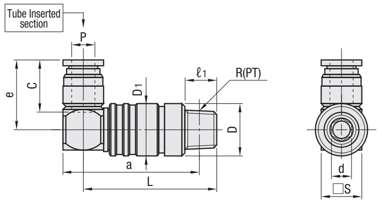
- M—AKC is a set product of M—AKCP and M—AK.
  Can be attached/detached easily.
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

M Joint section Body: Brass (C3604)+Nickel plating
Release ring: Polyacetal resin (POM)
Socket screw Brass (C3604)+Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
*Thread part is applied with heat resistant sealant.

Matching tubes	Tube inserting hole		D	D1	Hexagonal wrench socket	L	a	ℓ1	R(PT)	Components		Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C			⬡d					M—AKCP	M—AK	Type	No.	1～19
6×4	6	17	15	15	⬡5	44	40	8	1/8	08— 6P	08—01S	M—AKC	08— 601	Quotation
					⬡6	45.5	39.5	11	1/4		08—02S		08— 602	
8×6	8	18.5			⬡5	44.5	40.5	8	1/8	08— 8P	08—01S		08— 801	
					⬡6	46	40	11	1/4		08—02S		08— 802	
			18	18	⬡5	49.5	45.5	8	1/8	10— 8P	10—01S		10— 801	
					⬡8	51.5		11	1/4		10—02S		10— 802	
							45	12	3/8		10—03S		10— 803	
10×7.5	10	21			⬡5	52	48	8	1/8	10—10P	10—01S		10—1001	
					⬡8	54		11	1/4		10—02S		10—1002	
12×9	12	23.5		21	⬡5	61	57	8	1/8	10—12P	10—01S		10—1201	
					⬡8	63		11	1/4		10—02S		10—1202	
							56.5	12	3/8		10—03S		10—1203	

RoHS

M—AKL
(L-shaped Joint Set)



- M—AKL is a set product of M—AKLP and M—AK.
  Can be attached/detached easily.
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

M Joint section Body: Brass (C3604)+Nickel plating
Release ring: Polyacetal resin (POM)
Socket screw Brass (C3604)+Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
*Thread part is applied with heat resistant sealant.

Matching tubes	Tube inserting hole		D	D1	Hexagonal wrench socket	L	a	e	□S	ℓ1	R(PT)	Components		Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C			⬡d							M—AKLP	M—AK	Type	No.	1～19
6×4	6	17	15	15	⬡5	37	39	22	12	8	1/8	08— 6P	08—01S	M—AKL	08— 601	Quotation
					⬡6	38.5	38.5			11	1/4		08—02S		08— 602	
8×6	8	18.5			⬡5	38	41	24	14	8	1/8	08— 8P	08—01S		08— 801	
					⬡6	39.5	40.5			11	1/4		08—02S		08— 802	
			18	18	⬡5	43.5	46.5			8	1/8	10— 8P	10—01S		10— 801	
					⬡8	45.5				11	1/4		10—02S		10— 802	
							46			12	3/8		10—03S		10— 803	
10×7.5	10	21			⬡5	45	49.5	28	17	8	1/8	10—10P	10—01S		10—1001	
					⬡8	47				11	1/4		10—02S		10—1002	
							49			12	3/8		10—03S		10—1003	
12×9	12	23.5			⬡5	50.5	56.5	31	20	8	1/8	10—12P	10—01S		10—1201	
					⬡8	52.5				11	1/4		10—02S		10—1202	
							56			12	3/8		10—03S		10—1203	

Order

Part Number
M—AKC08—601
M—AKL10—1001

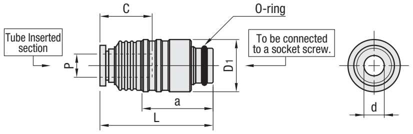
Days to Ship **Quotation**

Price **Quotation**

■Components

RoHS

M—AKCP
(Straight Joint Plug)



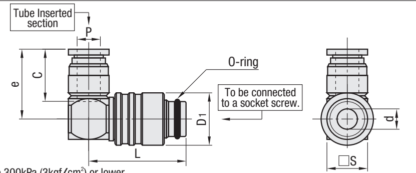
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

M Body: Brass (C3604)+Nickel plating
Release ring: Polyacetal resin (POM)

Matching tubes	Tube inserting hole		D1	d	L	a	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C					Type	No.	1～19
6×4	6	17	15	4.8	34	19	M—AKCP	08— 6P	
8×6	8	18.5		6.1	34.5			08— 8P	
			18	8.1	39	24		10— 8P	Quotation
10×7.5	10	21			41.5			10—10P	
12×9	12	23.5	21		50.5			10—12P	

RoHS

M—AKLP
(L-shaped Joint Plug)



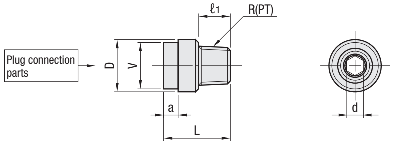
- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- Keep water temperature under 99℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

M Body: Brass (C3604)+Nickel plating
Release ring: Polyacetal resin (POM)

Matching tubes	Tube inserting hole		D1	d	L	e	□S	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C						Type	No.	1～19
6×4	6	17	15	4	27	22	12	M—AKLP	08— 6P	
8×6	8	18.5		6	28	24	14		08— 8P	
			18	8.1	33				10— 8P	Quotation
10×7.5	10	21			34.5	28	17		10—10P	
12×9	12	23.5			40	31	20		10—12P	

RoHS

M—AK
(Socket Screw)



- Use in normal pressure 300kPa (3kgf/cm²) or lower.
- M—AK: Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).

M Body: Brass (C3604)+Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
*Thread part is applied with heat resistant sealant.

D	V	Hexagonal wrench socket ⬡d	L	a	ℓ1	R(PT)	Part Number		U/Price
							Type	No.	1～19
15	13	⬡5	18.5	4.6	8	1/8	M—AK	08—01S	Quotation
		⬡6	20		11	1/4		08—02S	
18	15.5	⬡5	21	5.3	8	1/8		10—01S	
		⬡8	23		11	1/4		10—02S	
					12	3/8		10—03S	

Order

Part Number
M—AKCP08—6P
M—AKLP10—8P
M—AK10—02S

Days to Ship **Quotation**

Price **Quotation**

QUICK-FITTING JOINTS FOR MOLD COOLING —SEPARATE PLUG・SOCKET—

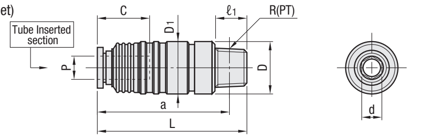
—FOR HIGH TEMPERATURE TYPE (HEAT RESISTANT 120℃ SERIES)—

■Set Products

RoHS

M—120AKC

(Straight Joint Set)



- M—120AKC is a set product of M—120AKCP and M—AK. Can be attached/detached easily.
- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

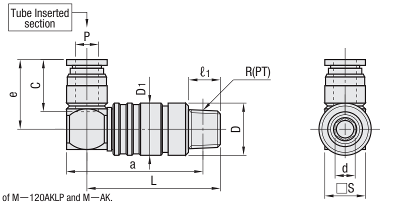
M Joint section	Body: Brass (C3604)＋Nickel plating Release ring: Polyacetal resin (POM)
Socket screw	Brass (C3604)＋Nickel plating
Thread	JIS B0203 tapered thread for tubing R(PT) *Thread part is applied with heat resistant sealant.

Matching tubes	Tube inserting hole		D	D1	Hexagonal wrench socket⬡ d	L	a	ℓ1	R(PT)	Components		Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C								M—120AKCP	M—AK	Type	No.	1～19
6×4	6	17	15	15	⬡ 5	44	40	8	1/8	08— 6P	08—01S	M—120AKC	08— 601	Quotation
					⬡ 6	45.5	39.5	11	1/4		08—02S		08— 602	
8×6	8	18.5			⬡ 5	44.5	40.5	8	1/8	08— 8P	08—01S		08— 801	
					⬡ 6	46	40	11	1/4		08—02S		08— 802	
			18	18	⬡ 5	49.5	45.5	8	1/8	10— 8P	10—01S		10— 801	
					⬡ 8	51.5		11	1/4		10—02S		10— 802	
							45	12	3/8		10—03S		10— 803	
10×7.5	10	21			⬡ 5	52	48	8	1/8	10—10P	10—01S		10—1001	
					⬡ 8	54		11	1/4		10—02S		10—1002	
							47.5	12	3/8		10—03S		10—1003	
12×9	12	23.5		21	⬡ 5	61	57	8	1/8	10—12P	10—01S		10—1201	
					⬡ 8	63		11	1/4		10—02S		10—1202	
							56.5	12	3/8		10—03S		10—1203	

RoHS

M—120AKL

(L-shaped Joint Set)



- M—120AKL is a set product of M—120AKLP and M—AK. Can be attached/detached easily.
- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

M Joint section	Body: Brass (C3604)＋Nickel plating Release ring: Polyacetal resin (POM)
Socket screw	Brass (C3604)＋Nickel plating
Thread	JIS B0203 tapered thread for tubing R(PT) *Thread part is applied with heat resistant sealant.

Matching tubes	Tube inserting hole		D	D1	Hexagonal wrench socket⬡ d	L	a	e	□S	ℓ1	R(PT)	Components		Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C										M—120AKLP	M—AK	Type	No.	1～19
6×4	6	17	15	15	⬡ 5	37	39	22	12	8	1/8	08— 6P	08—01S	M—120AKL	08— 601	Quotation
					⬡ 6	38.5	38.5			11	1/4		08—02S		08— 602	
8×6	8	18.5			⬡ 5	38	41	24	14	8	1/8	08— 8P	08—01S		08— 801	
					⬡ 6	39.5	40.5			11	1/4		08—02S		08— 802	
			18	18	⬡ 5	43.5	46.5			8	1/8	10— 8P	10—01S		10— 801	
					⬡ 8	45.5				11	1/4		10—02S		10— 802	
							46			12	3/8		10—03S		10— 803	
10×7.5	10	21			⬡ 5	45	49.5	28	17	8	1/8	10—10P	10—01S		10—1001	
					⬡ 8	47				11	1/4		10—02S		10—1002	
							49			12	3/8		10—03S		10—1003	
12×9	12	23.5			⬡ 5	50.5	56.5	31	20	8	1/8	10—12P	10—01S		10—1201	
					⬡ 8	52.5				11	1/4		10—02S		10—1202	
							56			12	3/8		10—03S		10—1203	

☎ Order

Part Number
M—120AKC08—601
M—120AKL10—1001

Days to Ship **Quotation**

P Price **Quotation**

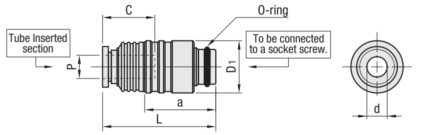
Non JIS material definition is listed on P.1351 - 1352

■Components

RoHS

M—120AKCP

(Straight Joint Plug)



- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

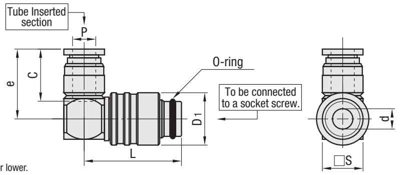
M Body: Brass (C3604)＋Nickel plating
Release ring: Polyacetal resin (POM)

Matching tubes	Tube inserting hole		D1	d	L	a	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C					Type	No.	1～19
6×4	6	17	15	4.8	34	19	M—120AKCP	08— 6P	Quotation
8×6	8	18.5		6.1	34.5			08— 8P	
			18	8.1	39	24		10— 8P	
10×7.5	10	21			41.5			10—10P	
12×9	12	23.5	21		50.5			10—12P	

RoHS

M—120AKLP

(L-shaped Joint Plug)



- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).
- Be sure to use an insert sleeve (P.1102) when using this socket.

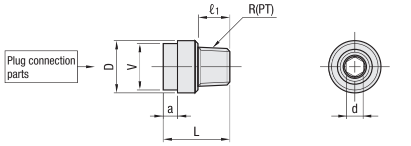
M Body: Brass (C3604)＋Nickel plating
Release ring: Polyacetal resin (POM)

Matching tubes	Tube inserting hole		D1	d	L	e	□S	Part Number		U/Price
Outer×Inner dia.	Hole dia. P	Depth C						Type	No.	1～19
6×4	6	17	15	4	27	22	12	M—120AKLP	08— 6P	Quotation
8×6	8	18.5		6	28	24	14		08— 8P	
			18	8.1	33				10— 8P	
10×7.5	10	21			34.5	28	17		10—10P	
12×9	12	23.5			40	31	20		10—12P	

RoHS

M—AK

(Socket Screw)



- Use in normal pressure 300kPa (3kgf/cm^2) or lower.
- Keep water temperature under 120℃.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum working pressure (300 kPa).

M Body: Brass (C3604)＋Nickel plating
Thread JIS B0203 tapered thread for tubing R(PT)
*Thread part is applied with heat resistant sealant.

D	V	Hexagonal wrench socket ⬡ d	L	a	ℓ1	R(PT)	Part Number		U/Price
							Type	No.	1～19
15	13	⬡ 5	18.5	4.6	8	1/8	M—AK	08—01S	Quotation
		⬡ 6	20		11	1/4		08—02S	
18	15.5	⬡ 5	21	5.3	8	1/8		10—01S	
		⬡ 8	23		11	1/4		10—02S	
					12	3/8		10—03S	

☎ Order

Part Number
M—120AKCP08—6P
M—120AKLP10—8P
M—AK10—02S

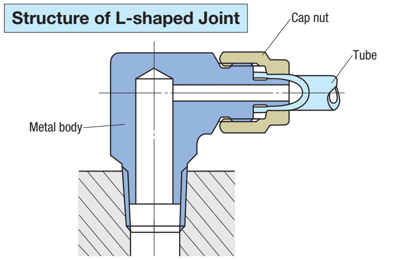
Days to Ship **Quotation**

P Price **Quotation**

GUIDE FOR BOLTING JOINTS FOR MOLD COOLING

■Bolting Joints High temperature type (Heat resistant 120℃ series)

Structure of L-shaped Joint



M−NSL

M−NKL

Features

- A structure in which tube insert can be tightened with a cap nut, where no torque control is required.

Specifications

Usable fluid	Water (fresh water), Air
Usable Pressure Range	Pressure Range of the tube applicable.
Usable Temperature Range	Depends on Tube Specifications Range

Please refer to P.1101 for specifications of tube.

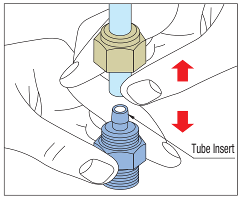
Tube Installation/Removal

①**Attaching tube**
- Check if the tube end is squarely cut (in the right angle), and it is not damaged or deformed.
- Insert the tube fitted with a cap nut to the root of the tube insert.
- Tighten the hexagonal part of the cap nut, to fit to the mold body with a spanner.
- Lightly pull the tube to make sure that it will not come out.
- When fitting the tube to bolting joints again, fit it after cutting the part fitted before. Usage without cutting could cause the tube to fall off unexpectedly or result in water leakage.

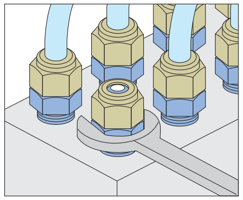
②**Tightening the screw**
- Tighten the hexagonal part or body rectangular part with a spanner.
- Since sealing materials are not put on the tapered thread for tubing, use sealing tapes or sealing materials if necessary. (When using/applying sealing tapes or sealing materials, leave 1.5- to 2.0- thread from the end of the screw.)

③**Detaching the tube**
- Detach the tube after holding the hexagonal part with a spanner and detaching the cap nut with another spanner.
- Be sure to stop the fluid such as water and air before detaching the tube.

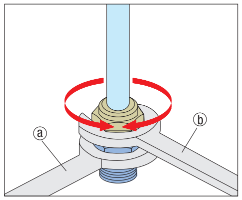
①



②



③



ⓐSpanner for the body
ⓑSpanner for cap nut

Notes

- Before removing the joint, make sure to check that the pressure from inside the tube has come down to zero and the temperature of the fluid (water) to below 30℃ for avoiding any accidents that may result from splashed hot fluid.
- Keep the joint body free of load(such as tension, torsion or bending to protect it from damage)
- Do not apply percussion flow (water hammer) to the joint.

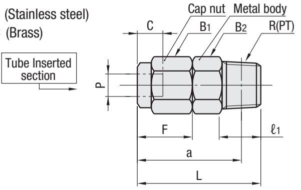
BOLTING JOINTS FOR MOLD COOLING

—FOR HIGH TEMPERATURE TYPE (HEAT RESISTANT 120℃ SERIES)—

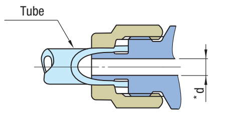
Non JIS material definition is listed on P.1351 - 1352
Use hot water tube (M—SFT **P.1101**)

■Straight joint RoHS

M—NSC (Stainless steel)
M—NKC (Brass)



Sectional view of tube inserting hole



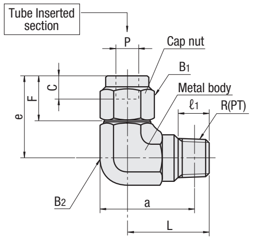
M Stainless steel (SUS316)
Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

Matching tubes Outer×Inner dia.	Tube inserting hole Hole dia. P	 Depth C	*d	L	a	Cap nut F	 B1 (side to side)	Metal body ℓ1	 B2 (side to side)	 R(PT)	Part Number Type	 No.	U/Price 1〜19
6×4	6	6	3	25.5	21.5	11.5	12	8	12	1/8	M—NSC (Stainless steel)	6—01	Quotation
				28.5	22.5			11	14	1/4		6—02	
				29.5	23.2			12	17	3/8		6—03	
8×6	8	7	5	27.5	23.5	13.5	14	8	14	1/8		8—01	
				30.5	24.5			11		1/4		8—02	
				31.5	25.2			12	17	3/8		8—03	
10×7.5	10	9	6	33.5	27.5	16.5	17	11	17	1/4		10—02	
				34.5	28.2			12		3/8		10—03	
12×9	12	9	7.5	33.5	27.5	16.5	19	11	19	1/4		12—02	
				34.5	28.2			12		3/8		12—03	
6×4	6	6	3	22	18.0	11	10	8	10	1/8	M—NKC (Brass)	6—01	
8×6	8	7	5	24	20.0	12	12	8	12	1/8		8—01	
				27	21.0			11	14	1/4		8—02	
10×7.5	10	9	6	29.8	23.8	14.8	16	11	16	1/4		10—02	
				31.8	25.5			12	17	3/8		10—03	
12×9	12	9	7.5	30.4	24.4	15.4	17	11	17	1/4		12—02	
				32.4	26.1			12		3/8		12—03	

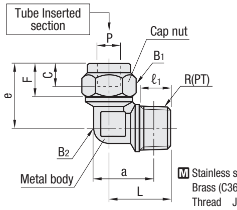
Use hot water tube (M—SFT **P.1101**)

■L-shaped joint RoHS

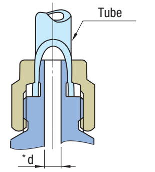
M—NSL (Stainless steel)



M—NKL (Brass)



Sectional view of tube inserting hole



M Stainless steel (SUS316)
Brass (C3604)
Thread JIS B0203 tapered thread for tubing R(PT)

Matching tubes Outer×Inner dia.	Tube inserting hole Hole dia. P	 Depth C	*d	L	a	e	Cap nut F	 B1 (side to side)	Metal body ℓ1	 B2 (side to side)	 R(PT)	Part Number Type	 No.	U/Price 1〜19
6×4	6	6	3	21	23.9	21	11.5	12	8	12	1/8	M—NSL (Stainless steel)	6—01	Quotation
				22	24.1	22			11	14	1/4		6—02	
				29	33.6	29			12	19	3/8		6—03	
8×6	8	7	5	25	30.8	25	13.5	14	8	17	1/8		8—01	
					28.8				11		1/4		8—02	
				29	33.6	29			12	19	3/8		8—03	
10×7.5	10	9	6	29	34	29	16.5	17	11	19	1/4		10—02	
					33.6				12		3/8		10—03	
12×9	12	9	7.5	29	34	29	16.5	19	11	19	1/4		12—02	
					33.6				12		3/8		12—03	
6×4	6	6	3	17	18.8	20	11	10	8	8	1/8	M—NKL (Brass)	6—01	
8×6	8	7	5	19.5	22.5	23	12	12	8	10	1/8		8—01	
				21.5					11		1/4		8—02	
10×7.5	10	9	6	24	27.2	28	14.8	16	11	14	1/4		10—02	
					26.9				12		3/8		10—03	
12×9	12	9	7.5	24	27.8	28.5	15.4	17	11	14	1/4		12—02	
					27.5				12		3/8		12—03	

Order	Part Number	Days to Ship		Price	
	M—NSC 8—02 M—NSL10—03		Quotation		Quotation

MOLD COUPLING

—SOCKET・PLUG— ～HEAT RESISTANCE 180℃～

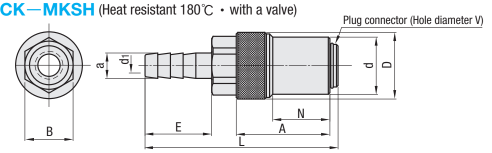
Compatible with MISUMI mold couplers.

■Sockets

RoHS

For hose attachment

10PACK—MKSH (Heat resistant 180℃ ・with a valve)

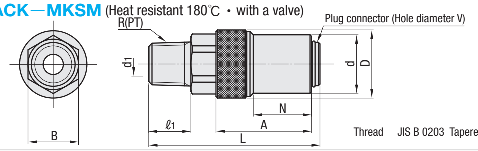


M Brass (C3604)

RoHS

For female screw joint

10PACK—MKSM (Heat resistant 180℃ ・with a valve)



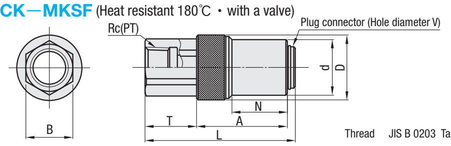
M Brass (C3604)

Thread JIS B 0203 Tapered thread for tubing R(PT)

RoHS

For male screw joint

10PACK—MKSF (Heat resistant 180℃ ・with a valve)



M Brass (C3604)

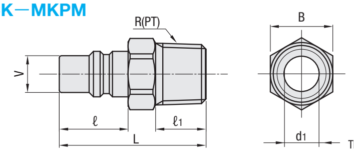
Thread JIS B 0203 Tapered thread for tubing Rc(PT)

Matching Plug	Plug connection parts					L	d1	Allen side B	For hose		Tapered male thread R(PT)	ℓ1	Tapered female screw Rc(PT)	T	Part Number		U/Price
	Hole diameter (V)	d	D	A	N				a	E					Type	No.	10PACKS
・Mold coupling ・Mold Couplers tip diameter V=8 Common to all sizes	8	18	21	29.5	18	60.8	5	17	8	21	—	—	—	—	10PACK—MKSH	2	Quotation
							7		12							3	
						52.8	6.5		—	—	1/4	13			10PACK—MKSM	2	
											3/8					3	
						48.8	—				—	—	1/4	16.5	10PACK—MKSF	2	

■ Plugs

RoHS

10PACK—MKPM (Hexagonal head type)
30PACK—MKPM



M Brass (C3604)

Thread JIS B 0203 Tapered thread for tubing R(PT)

Matching socket	Socket connection section		L	Allen side B	Inner dia. d1	Tapered thread R(PT)	ℓ1	Part Number		U/Price	
	Hole diameter (V)	ℓ						Type	No.	10PACKS	30PACKS
・Mold coupling ・Mold coupler Socket hole diameter V=8 Common to all sizes	8	15	31	12	6	1/8	10	10PACK—MKPM 30PACK—MKPM	1	Quotation	
			32	14		1/4	11		2		
			35	19		3/8	14		3		

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Heat resistance is 180℃, and it can be used for both water and oil.

Order	Part Number
	10PACK—MKSH2

Days to Ship: Quotation

MOLD HIGH COUPLING

—SOCKET・PLUG— ～HEAT RESISTANCE 180℃

Compatible with MISUMI high couplers for cooling water pipe.

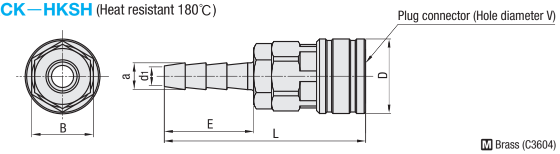
Non JIS material definition is listed on P.1351 - 1352

■Sockets

RoHS

For hose attachment

10PACK—HKSH (Heat resistant 180℃)

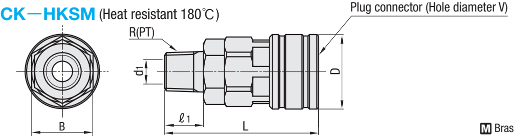


M Brass (C3604)

RoHS

For female screw joint

10PACK—HKSM (Heat resistant 180℃)



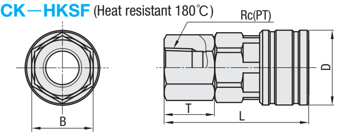
M Brass (C3604)

Thread JIS B 0203 Tapered thread for tubing R(PT)

RoHS

For male screw joint

10PACK—HKSF (Heat resistant 180℃)



M Brass (C3604)

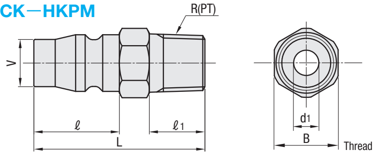
Thread JIS B 0203 Tapered thread for tubing Rc(PT)

Matching Plug	Plug connection parts		L	d1	Allen side B	For hose		Tapered male thread R(PT)	ℓ1	Tapered female screw Rc(PT)	T	Part Number		U/Price
	Hole diameter (V)	D				a	E					Type	No.	10PACKS
・Mold coupling ・High coupler tip diameter V=10.9	10.9	25	67.5	5	21	9	30	—	—	—	—	10PACK—HKSH	2	Quotation
			67.5	7.5		11.2	30						3	
			51.5	7		—	—	1/4	13			10PACK—HKSM	2	
			52.5	8				3/8	14				3	
			48.5	—				—	—	1/4	17	10PACK—HKSF	2	

■ Plugs

RoHS

10PACK—HKPM (Hexagonal head type)
30PACK—HKPM



M Brass (C3604)

Thread JIS B 0203 Tapered thread for tubing R(PT)

Matching sockets	Socket connection section		L	Allen side B	Inner dia. d1	Tapered thread R(PT)	ℓ1	Part Number		U/Price	
	V	ℓ						Type	No.	10PACKS	30PACKS
・Mold coupling ・High coupler socket hole diameter V=10.9	10.9	20	36	14	4.5	1/8	10	10PACK—HKPM 30PACK—HKPM	1	Quotation	
			40		7.5	1/4	13		2		
			41	19		3/8	14		3		

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Heat resistance is 180℃, and it can be used for both water and oil.

Order	Part Number
	10PACK—HKSH2

Days to Ship: Quotation

BOTH VALVES SP COUPLING

—SOCKET・PLUG— ～HEAT RESISTANT 180℃～

Compatible with MISUMI SP coupler for double valve cooling.

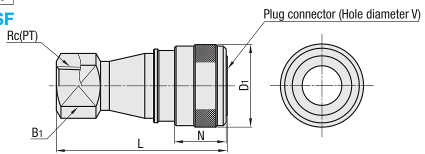
Sockets

RoHS

For male screw joint

10PACK—SPSF

(Heat resistant 180℃)



M Brass (C3604)

Matching Plug	Plug connection parts			L	Dihedral side	Taper female thread	Part Number		U/Price
	Hole diameter (V)	N	D_1		B_1	Rc(PT)	Type	No.	10PACKS
・SP coupling ・SP coupler Tip diameter V=14	14	17.5	28	58	17	1/4	10PACK—SPSF	2	Quotation
・SP coupling ・SP coupler Tip diameter V=19	19	20	35	65	21	3/8		3	

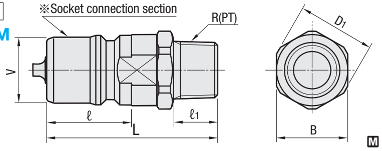
Plugs

RoHS

For female screw joint

10PACK—SPPM

(Heat resistant 180℃)



M Brass (C3604)

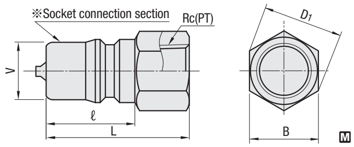
Matching socket	Socket connection section		L	D_1	Allen side	Tapered male thread	ℓ_1	Part Number		U/Price
	Hole diameter (V)	ℓ			B	R(PT)		Type	No.	10PACKS
・SP coupling ・SP coupler Tip diameter V=14	14	22	43.5	18.5	17	1/4	12	10PACK—SPPM	2	Quotation
・SP coupling ・SP coupler Tip diameter V=19	19	25.2	50.4	23	21	3/8	13		3	

RoHS

For male screw joint

10PACK—SPPF

(Heat resistant 180℃)



M Brass (C3604)

Matching socket	Socket connection section		L	D_1	Allen side	Taper female thread	Part Number		U/Price
	Hole diameter (V)	ℓ			B	Rc(PT)	Type	No.	10PACK
・SP coupling ・SP coupler Tip diameter V=14	14	22	35.5	18.5	17	1/4	10PACK—SPPF	2	Quotation
・SP coupling ・SP coupler Tip diameter V=19	19	25.2	39.9	23	21	3/8		3	

- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Heat resistance is 180℃, and it can be used for both water and oil.
- For SP coupling, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.

Order	Part Number	Days to Ship
	10PACK—SPSF2	Quotation

BOTH VALVES SP COUPLING

—STAINLESS SOCKET・PLUG— ～HEAT RESISTANT 180℃～

Compatible with MISUMI SP coupler for double valve cooling.

Non JIS material definition is listed on P.1351 - 1352

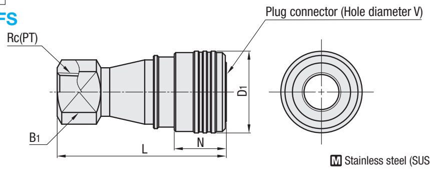
Sockets

RoHS

For male screw joint

10PACK—SPSFS

(Heat resistant 180℃)



M Stainless steel (SUS303)

Matching Plug	Plug connection parts			L	Dihedral side	Tapered female screw	Part Number		U/Price
	Hole diameter (V)	N	D_1		B_1	Rc(PT)	Type	No.	10PACKS
・SP coupling ・SP coupler Tip diameter V=14	14	17.5	28	58	17	1/4	10PACK—SPSFS	2	Quotation
・SP coupling ・SP coupler Tip diameter V=19	19	20	35	65	21	3/8		3	

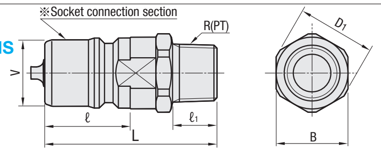
Plugs

RoHS

Hexagonal head type

10PACK—SPPMS

(Heat resistant 180℃)



M Stainless steel (SUS303)

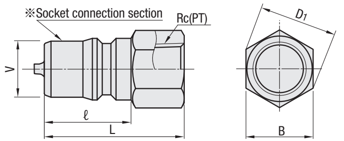
Matching socket	Socket connection section		L	D_1	Allen side	Tapered male thread	ℓ_1	Part Number		U/Price
	V	ℓ			B	R(PT)		Type	No.	10PACKS
・SP coupling ・SP coupler Tip diameter V=14	14	22	43.5	18.5	17	1/4	12	10PACK—SPPMS	2	Quotation
・SP coupling ・SP coupler Tip diameter V=19	19	25.2	50.4	23	21	3/8	13		3	

RoHS

For male screw joint

10PACK—SPPFS

(Heat resistant 180℃)



M Stainless steel (SUS303)

Matching socket	Socket connection section		L	D_1	Allen side	Tapered female screw	Part Number		U/Price
	V	ℓ			B	Rc(PT)	Type	No.	10PACKS
・SP coupling ・SP coupler Tip diameter V=14	14	22	35.5	18.5	17	1/4	10PACK—SPPFS	2	Quotation
・SP coupling ・SP coupler Tip diameter V=19	19	25.2	39.9	23	21	3/8		3	

- Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.
- Heat resistance is 180℃, and it can be used for both water and oil.
- For SP coupling, there are automatic open/close valves in socket and plug respectively due to the structure of double valves.
- These stainless products resist rust.

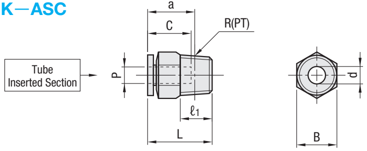
Order	Part Number	Days to Ship
	10PACK—SPSFS2	Quotation

QUICK-FITTING JOINTS FOR MOLD COOLING —INTEGRATED PLUG・SOCKET—

—STANDARD (HEAT RESISTANT 60℃ SERIES)—

RoHS

10PACK—ASC (Straight Joint Plug—Spanner type)
30PACK—ASC

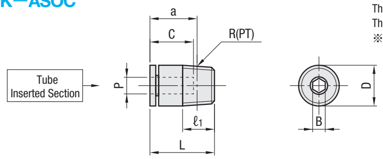


M Body : Brass (C3604)+Nickel plated
Release ring : PBT
Thread : Brass (C3604)+Nickel plated
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

Matching tubes	Tube inserting hole		d	L	a	Allen side	ℓ_1	R(PT)	Part Number		U/Price	
Ext. dia.×Int. dia.	Hole diameter P	Depth C				B			Type	No.	10PACKS	30PACKS
4×2.5	4	16	2.5	20.5	16.5	10	8	1/8	10PACK—ASC 30PACK—ASC	4—01	Quotation	
6×4	6	17.5	4	23	19	12	8	1/8		6—01		
6×4	6	17.5	4	23.5	18	14	11	1/4		6—02		
8×6	8	19	5	28	24	14	8	1/8		8—01		
8×6	8	19	6	27	21.5	14	11	1/4		8—02		
8×6	8	19	6	22.5	16.5	17	12	3/8		8—03		
10×7.5	10	21.5	5	31	27	17	8	1/8		10—01		
10×7.5	10	21.5	8	32.5	27	17	11	1/4		10—02		
10×7.5	10	21.5	8	28.5	22.5	17	12	3/8		10—03		
12×9	12	23	8	35.5	30	19	11	1/4		12—02		
12×9	12	23	10	30.5	24.5	19	12	3/8		12—03		

RoHS

10PACK—ASOC (Straight Joint Plug—Hexagonal wrench type)
30PACK—ASOC

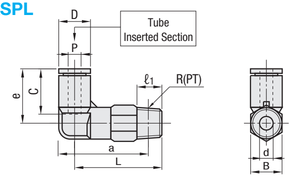


M Body : Brass (C3604)+Nickel plated
Release ring : PBT
Thread : Brass (C3604)+Nickel plated
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

Matching tubes	Tube inserting hole		D	Allen side	L	a	ℓ_1	R(PT)	Part Number		U/Price	
Ext. dia.×Int. dia.	Hole diameter P	Depth C		B					Type	No.	10PACKS	30PACKS
4×2.5	4	16	9.8	2.5	20.5	16.5	8	1/8	10PACK—ASOC 30PACK—ASOC	4—01	Quotation	
6×4	6	17.5	11.8	4	23	19	8	1/8		6—01		
8×6	8	19	14	5	28	24	8	1/8		8—01		
8×6	8	19	14	6	27	21.5	11	1/4		8—02		
10×7.5	10	21.5	17.5	6	28.5	23	11	1/4		10—02		
10×7.5	10	21.5	17.5	8	28.5	22.5	12	3/8		10—03		
12×9	12	23	19.5	8	29.5	23.5	12	3/8		12—03		

RoHS

10PACK—ASPL (L-Shaped Joint—Spanner type)
30PACK—ASPL



M Body : Polybutylene terephthalate resin (PBT)
Release ring : PBT
Thread : Brass (C3604)+Nickel plated
Thread JIS B 0203 tapered thread for tubing R(PT)
※Thread part is applied with sealant.

Matching tubes	Matching tubes		Tube inserting hole		D	d	L	a	e	B	ℓ_1	R(PT)	Part Number		U/Price	
Ext. dia.×Int. dia.	Diameter	Int. Dia.	Hole diameter P	Depth C									Type	No.	10PACKS	30PACKS
6×4	6	4	6	17.5	12.5	4	24	26.25	21	12	8	1/8	10PACK—ASPL 30PACK—ASPL	6—01	Quotation	
6×4	6	4	6	17.5	12.5	4	27.5	28.25	21	14	11	1/4		6—02		
8×6	8	6	8	19	14.5	6	25.5	28.75	23.5	14	8	1/8		8—01		
8×6	8	6	8	19	14.5	6	28.5	30.25	23.5	14	11	1/4		8—02		
10×7.5	10	7.5	10	21.5	17.5	6.5	28	32.75	27	17	8	1/8		10—01		
10×7.5	10	7.5	10	21.5	17.5	8	31	34.25	27	17	11	1/4		10—02		
10×7.5	10	7.5	10	21.5	17.5	8	32.5	35.25	27	17	12	3/8		10—03		
12×9	12	9	12	23	20	8.5	33	37.5	29.5	19	11	1/4		12—02		
12×9	12	9	12	23	20	9	34.5	38.5	29.5	19	12	3/8		12—03		

☎ Order

Part Number	—	No.
10PACK—ASC		4—01

Days to Ship **Quotation**

■Characteristics

- Keep water temperature under 60℃.

※Notes

- Use in atmospheric pressure 300kPa (3kgf/cm²) or lower.
- Set the surge pressure (the pressure that acts instantaneously due to an impact flow) so that it does not exceed the maximum pressure (300 kPa).
- Be sure to use an insert sleeve when using this socket.

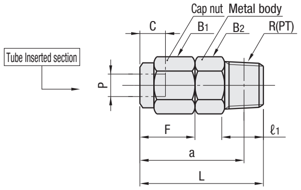
BOLTING JOINTS FOR MOLD

—FOR HIGH TEMPERATURE (HEAT RESISTANT 180℃ SERIES)—

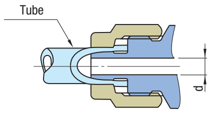
Non JIS material definition is listed on P.1351 - 1352
Use hot water tube (M—SFT ☞ **P.1101**).

■Straight joint RoHS

10PACK—NASC (Stainless steel)



Sectional view of tube inserting hole

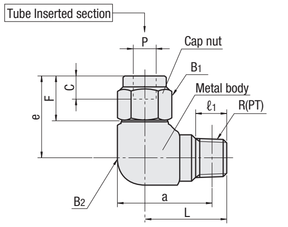


M Stainless steel (SUS316)
Brass (C3604)
Thread JIS B 0203 Tapered thread for tubing R(PT)

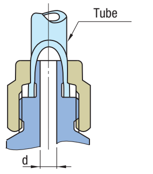
Matching tubes	Tube inserting hole		d	L	a	Cap nut		Metal body			Part Number		U/Price
Ext. dia.×Int. dia.	Hole diameter P	Depth C				F	B1 (side)	ℓ_1	B2 (side)	R(PT)	Type	No.	10PACKS
6×4	6	7	3.4	26	21.5	12.5	12	9	12	1/8	10PACK—NASC (Stainless steel)	6—01	Quotation
8×6	8	7.5	5.4	28	23.5	14	14	9	14	1/8		8—01	
8×6	8	7.5	5.4	30	24.5	14	14	11	14	1/4		8—02	
10×7.5	10	8	6.9	32	26.5	15.5	17	11	17	1/4		10—02	

■L-shaped joint RoHS

10PACK—NASL (Stainless steel)



Sectional view of tube inserting hole



M Stainless steel (SUS316)
Thread JIS B 0203 Tapered thread for tubing R(PT)

Matching tubes	Tube inserting hole		d	L	a	e	Cap nut		Metal body			Part Number		U/Price
Ext. dia.×Int. dia.	Hole diameter P	Depth C					F	B1 (side)	ℓ_1	B2 (side)	R(PT)	Type	No.	10PACKS
6×4	6	7	3.4	18	18	21.5	12.5	12	9	12	1/8	10PACK—NASL (Stainless steel)	6—01	Quotation
8×6	8	7.5	5.4	19	19.5	24	14	14	9	14	1/8		8—01	
8×6	8	7.5	5.4	21	20.5	24	14	14	11	14	1/4		8—02	
10×7.5	10	8	6.9	22	22	26.5	15.5	17	11	17	1/4		10—02	

☎ Order

Part Number	—	No.
10PACK—NASC		6—01

Days to Ship **Quotation**

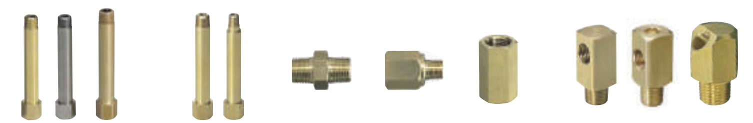
■Characteristics

- Can be used for water and oil.
- Keep water temperature under 180℃.

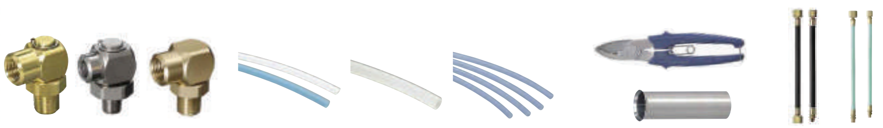
※Notes

- Before removing the joint, make sure to check that the pressure from inside the tube has come down to zero and the temperature of the fluid (water) to below 30℃ for avoiding any accidents that may result from splashed hot fluid.
- Keep the joint body free of load(such as tension, torsion or bending to protect it from damage)
- Do not apply percussion flow (water hammer) to the joint.
- Be sure to stop the fluid such as water and air before detaching the tube.

COOLING ITEMS ② JOINTS · HOSES · COOLING INSIDE OF MOLD



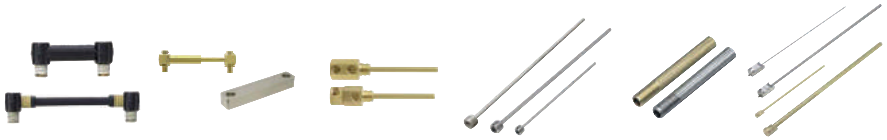
Product Name	Part Number	Page
Cooling Joint Plugs	JTW	1095
	JTWS	1095
	HX−JTW	1095
−Converting tapered screw type−	JTWF	1096
Cooling Joints	JEMM JEMMR	1097
	JEMF JEMFR	1097
	JEFS JEFSR	1098
L-shaped Cooling Joints	JEFL	1099
	JEFLR	1099
	JELF	1099



Product Name	Part Number	Page
L-shaped Swivel Joints	LSNF	1100
	SUS−LSNF	1100
	LSNFM	1100
Hot-Water Tubes	M−NB	1101
	M−WE	1101
	M−SFT	1101
Tube Cutters	M−TCN	1102
Insert Sleeves	10PACK−M−WR	1102
Rubber Hoses for High Heat	KGHA	1103
	WHSG	1103

Product Name	Part Number	Page
Rubber Hose for High-Temperature Water	KGH	1104
Hot-Water Hoses	MHW	1104
Hose Bands	MHBT	1104
TSP Couplers For Cooling -For Pressure-Resistant Hose Insertion/Sockets · Plugs	MH−TSPN	1105
	MH−TSPS	1105
Mold-Cooling Flexible Hoses	FSHP	1107
	FSHF	1107
Plugs for High-Temperature Hose	FSHG FSHGR	1108

Product Name	Part Number	Page
L-shaped Plugs for High-Temperature Hose	FSHL	1108
	FSHLR	1108
	FSHLS	1108
Mold-Cooling Flexible Hoses (Stainless Steel)	SUS−TKSP	1109
	SUS−TKSF	1109
Flexible Hose Plugs (Stainless Steel)	SUS−TKMM	1110
	SUS−TKMF	1110
Mold-Cooling Flexible Hoses (Stainless Steel)−Flexible Type−	SUS−TKHP	1111
	SUS−TKHF	1111



Product Name	Part Number	Page
Uni-joint Plugs	JWRL	1112
	JWRF	1112
UNI-JOINT PLUGS/HYDRO-CIRCUIT BLOCKS−HEAT PROOF TYPE−	JWRH	1113
	BRJH	1113
SPOT COOLING PIPES	SWCP	1114
	SWCT	1114
Cooling Pipes −Tapered Screw Type−	WCPPT	1115
−Parallel Screw Type−	WCPM	1115
−Brass · Stainless type−	WCP	1115
	WCSP	1115
−Dowel pin type · Flange type−	WCPN	1116
	WCPNT	1116
	WCPST	1116

Product Name	Part Number	Page
−Brazing joint · Tapered Screw type−	WCPFT	1117
−Parallel screw · Caulking type−	WCPF	1117
	WCPK	1117
Baffle Boards−Tapered screw plug type−	BFPT	1118
Stainless steel Baffle Boards−Tapered screw plugs type−	BFPTS	1119
−Partition function type−	BFPTP−S · BFPTP−W	1120
Baffle Boards	BF□□R	1121
	BF□□	1122

Product Name	Part Number	Page
Spiral Baffle Boards−Separate type／Straight type−	WRCAN	1124
	WRCTN	1124
	WRCBN	1124
	WRCCN	1124
Heat Transaction Pipes	WHP	1126
Mold Manifolds	KMB	1127
	KMS	1127
Cooling Circuit Plugs−All-in-one type−	JWPZ	1129
	50PACK−JWPZ	1129
	100PACK−JWPZ	1129

Product Name	Part Number	Page
Tools for Cooling Circuit Plug	JWPKS JWPKW JWPK3 JWPK4 JWPK6	1130
Air Jet Coders for Mold	AJCMV	1131
	AJCMH	1131
Cooling Circuit Plugs	JWP	1133
−Metal bar type−	JWPMT	1134
Screw Plugs with O-ring	MSWM	1135
Tapered Screw Plugs	MSWT	1135
	MSWTS	1135

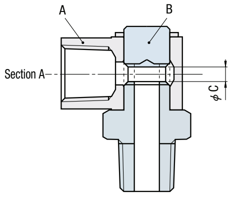
Product Name	Part Number	Page
Sealing Tapes	JST8−5	1135
	JST13−15	1135
Flow Checkers for Cooling Water	FLM−F	1136
Marker Rings	JMR	1136
O-rings	ORS	1137
	ORP	1137
	ORG	1137

■Component drawing for L-shaped swivel type

P.1052 · P.1056 · P.1059 · P.1070 · P.1100

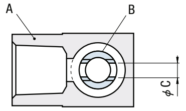
Conventional L-shaped swivel joint

Vertical section view A



Part Number	Page
LSP	P.1052
JPHL	P.1056
JPLJ	P.1059
LSN	P.1070
LSNF	P.1100
SVS−LSNF	P.1100

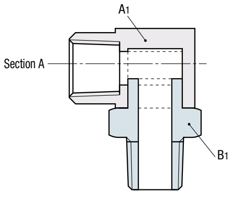
Cross section view A



Conventional L-shaped swivel joint is composed of part A and B.
Part B has a side hole ϕC to form flow channel.
Press the incoming fluid at this joint. Flow volume at the inlet and outlet varies.
By rotating Part A to misalign side hole ϕC position, the fluid flow becomes more fluent.

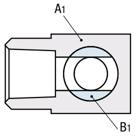
New L-shaped swivel joint Constant flow type

Vertical section view



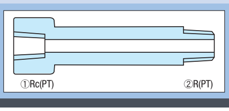
Part Number	Page
LSPM	P.1052
JPHLM	P.1056
JPLJM	P.1059
JSNM	P.1070
LSNFM	P.1100

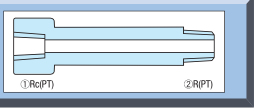
Cross section view A



New L-shaped swivel joint is composed of part A_1 and B_1.
Fluid flow variation at the inlet and outlet becomes relatively narrower due to different structure from conventional type.
Available to secure constant flow rate at any position by rotating Part A_1.

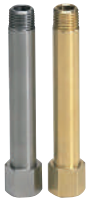
COOLING JOINT PLUGS





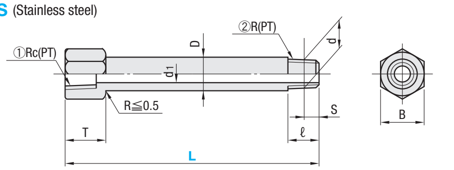
■ Cooling joints

RoHS



JTW not conform to RoHS.

JTW (Brass)
JTWS (Stainless steel)


①Rc(PT)
②R(PT)
D
d1
d
R≦0.5
S
B
T
ℓ
L

M **JTW** Brass (C3604)
JTWS Steel (SUS304)

Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Thread part JIS B 0203 Tapered thread for tubing $\frac{R}{Rc}$ (PT)

B	T	D	d1	ℓ	S	d	① Rc(PT)	② R(PT)	Part Number Type	No.	L 5mm increments	10mm increments
14	13	10.5	6	10	3.97	9.728	1/8	1/8	JTW JTWS(L≦250)	1	30～200	210～300
17	16	13.8	8	10	6.01	13.157	1/4	1/4		2		
21	17	17.3	10	12	6.35	16.662	3/8	3/8		3		

JTWS is L≦250.

Order

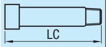
Part Number	—	L
JTW 2	—	150
JTWS 2	—	200

Days to Ship Quotation

Price Quotation

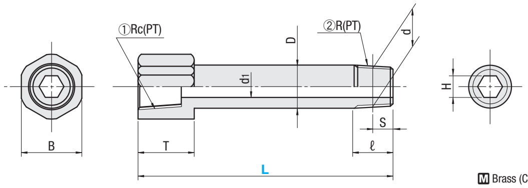
Alterations

Part Number	—	(LC)
JTW2	—	LC135

Alteration	Code	Spec.	1Code
	LC	LC=1mm increments 30<LC<250 Dimensions of the head and thread remain unchanged	Quotation

RoHS

HX—JTW Brass (Hexagonal hole type)


①Rc(PT)
②R(PT)
D
d1
d
H
S
B
T
ℓ
L

M Brass (C3604)

Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
Hexagonal holes bored at the tapered screw②.

Thread JIS B0203 tapered thread for tube $\frac{R}{Rc}$ (PT)

B	T	D	d1	Hexagonal wrench socket ⬡ H	ℓ	S	d	① Rc(PT)	② R(PT)	Part Number Type	No.	L
14	13	10	6	⬡ 6	9	3.97	9.728	1/8	1/8	HX—JTW	1	50～150 (10mm increments)
17	16	13	8	⬡ 8	11	6.01	13.157	1/4	1/4		2	
21	17	17	10	⬡10	13	6.35	16.662	3/8	3/8		3	50・100・150 (Selection)

Specification of d1 dimension and Hexagonal wrench socket changed.

Order

Part Number	—	L
HX—JTW1	—	120

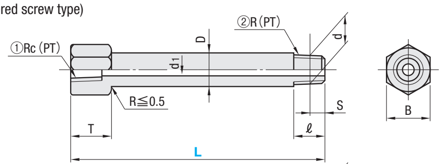
Price Quotation

Days to Ship Quotation

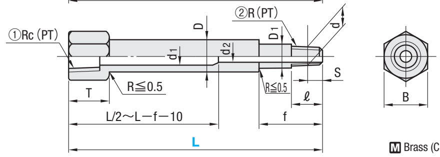
Non JIS material definition is listed on P.1351 - 1352

JTWF (Converting tapered screw type)

No.12・23


①Rc (PT)
②R (PT)
D
d1
d
R≦0.5
S
B
T
ℓ
L

No.21・32


①Rc (PT)
②R (PT)
D
D1
d1
d2
d
R≦0.5
R≦0.5
S
B
T
ℓ
L/2～L—f—10
f
L

M Brass (C3604)

Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Thread JIS B0203 tapered thread for tube $\frac{R}{Rc}$ (PT)

B	T	D	D1	d1	d2	f	ℓ	S	d	① Rc(PT)	② RP(T)	Part Number Type	No.	L 10mm increments
17	16	13.8	—	6	—	—	10	6.01	13.157	1/8	1/4	JTWF	12	50～200
21	17	17.3		8			12	6.35	16.662	1/4	3/8		23	
17	16	13.8	11		6	15	10	3.97	9.728	1/4	1/8		21	
21	17	17.3	14	10	8			6.01	13.157	3/8	1/4		32	

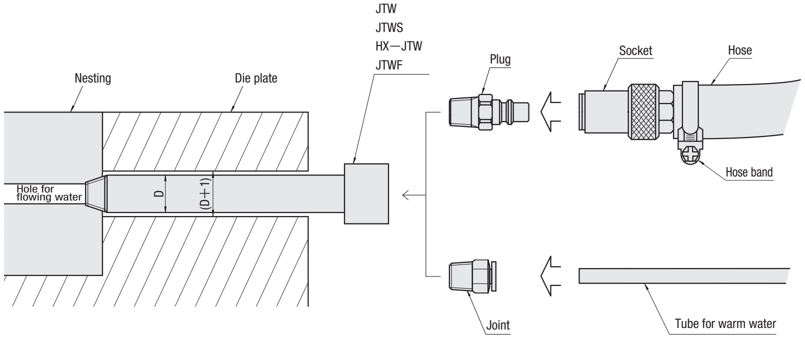
Order

Part Number	—	L
JTWF 12	—	150

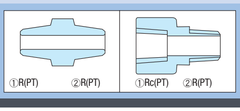
Price Quotation

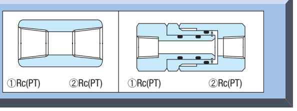
Days to Ship Quotation

Example

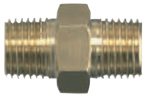

JTW
JTWS
HX—JTW
JTWF
Nesting
Die plate
Plug
Socket
Hose
Hose band
Hole for flowing water
D
(D+1)
Joint
Tube for warm water

COOLING JOINTS

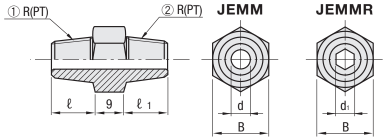




Non JIS material definition is listed on P.1351 - 1352



JEMM (Male・male adapter joint)
JEMMR (Male・male adapter joint—Hexagonal hole type—)



M Brass (C3604)
Thread JIS B0203 tapered thread for tube R(PT)

B	d	Hexagonal wrench socket ⬡ d1	ℓ	ℓ1	① R(PT)	② R(PT)	Part Number Type	No.	U/Price 1~9 JEMM	JEMMR
14	6	⬡ 6	10	10	1/8	1/8	JEMM JEMMR	11	Quotation	
17						1/4		12		
21				12		3/8		13		
17	8	⬡ 8		10	1/4	1/4		22		
21				12		3/8		23		
	10	⬡10	12		3/8	3/8		33		

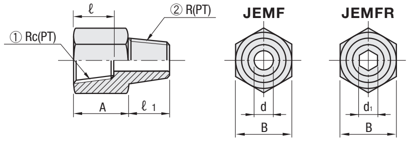
Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Order Part Number **JEMM23**

P **Price** Quotation

Days to Ship Quotation

JEMF (Female・male adapter joint)
JEMFR (Female・male adapter joint—Hexagonal hole type—)



M Brass (C3604)
Thread JIS B0203 tapered thread for tube $\frac{R}{Rc}$ (PT)

A	B	d	Hexagonal wrench socket ⬡ d1	ℓ	ℓ1	① Rc(PT)	② R(PT)	Part Number Type	No.	U/Price 1~9 JEMF	JEMFR
14	17	6	⬡ 6	10	10	1/8	1/8	JEMF JEMFR	11	Quotation	
16							1/4		12		
						1/4	1/8		21		
	21	8	⬡ 8		12		1/4		22		
				12			3/8		23		
		6	⬡ 6		10	3/8	1/8		31		
		8	⬡ 8		12		1/4		32		
		10	⬡10				3/8		33		

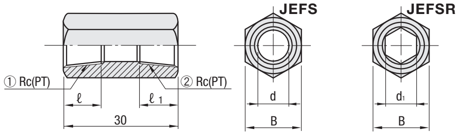
Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Order Part Number **JEMF 21**

P **Price** Quotation

Days to Ship Quotation

JEFS (Female・female adapter joint)
JEFSR (Female・female adapter joint—Hexagonal hole type—)



M Brass (C3604)
Thread JIS B0203 tapered thread for tube Rc(PT)

B	d	Hexagonal wrench socket ⬡ d1	ℓ	ℓ1	① Rc(PT)	② Rc(PT)	Part Number Type	No.	U/Price 1~9 JEFS	JEFSR
17	6	⬡ 6	10	10	1/8	1/8	JEFS JEFSR	11	Quotation	
						1/4		12		
19	8	⬡ 8			1/4			22		
				12		3/8		23		
22	10	⬡10	12		3/8			33		

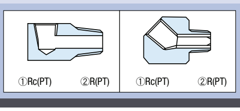
Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Order Part Number **JEFS23**

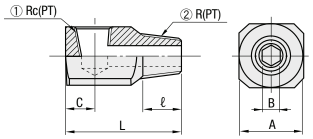
P **Price** Quotation

Days to Ship Quotation

L-SHAPED COOLING JOINTS



JEFL (Female・male L-shaped adapter joint)

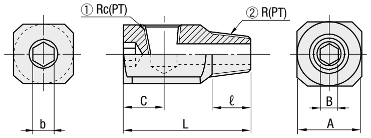


M Brass (C3604)

Hexagonal holes bored at the tapered screw ②.

Thread JIS B0203 tapered thread for tube $^{R}_{Rc}$ (PT)

JEFLR (Female・male L-shaped adapter joint—Hexagonal hole type—)



M Brass (C3604)

Hexagonal holes bored at the tapered screw ②.

Thread JIS B0203 tapered thread for tube $^{R}_{Rc}$ (PT)

A	Hexagonal wrench socket ⬡B	Hexagonal wrench socket ⬡b	L	C	ℓ	① Rc(PT)	② R(PT)	Part Number Type	Part Number No.	U/Price 1~9
14	⬡6	—	35	12	9	1/8	1/8	JEFL	11	Quotation
			37	11	11		1/4		12	
17.5			41		9	1/4	1/8		21	
			43		11		1/4		22	
22	⬡8		45		13		3/8		23	
	⬡6		48	13	11	3/8	1/4		32	
	⬡8		50		13		3/8		33	
14	⬡6	⬡6	35	12	9	1/8	1/8	JEFLR	11	
17.5			47.3	15.3	11	1/4	1/4		22	
22	⬡8	⬡8	56	18	13	3/8	3/8		33	

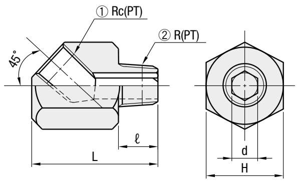
Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Order **Part Number**
JEFL 22

Price Quotation

Days to Ship Quotation

JEFL (Adapter joint・45° type)



M Brass (C3604)

Note that JELF do not turn as LSNF.

Hexagonal holes bored at the tapered screw ②.

Thread JIS B0203 tapered thread for tube $^{R}_{Rc}$ (PT)

H	Hexagonal wrench socket ⬡d	① Rc(PT)	② R(PT)	ℓ	L	Part Number Type	Part Number No.	U/Price 1~9
19	⬡6	1/8	1/8	10	30	JELF	11	Quotation
	⬡8		1/4	12	32		12	

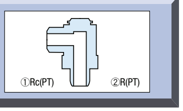
Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower.

Order **Part Number**
JELF 11
JEFLR22

Price Quotation

Days to Ship Quotation

L-SHAPED SWIVEL JOINTS



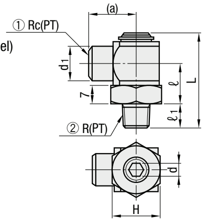
Non JIS material definition is listed on P.1351 - 1352

RoHS

LSNF not conform to RoHS.

L-shaped Swivel Joints

LSNF (Brass)
SUS—LSNF (Stainless steel)



M LSNF Brass (C3604)
SUS—LSNF Stainless steel (SUS303)

Values in ( ) are reference only.

Hexagonal holes bored at the tapered screw②.

Thread JIS B0203 tapered thread for tube $^{R}_{Rc}$ (PT)

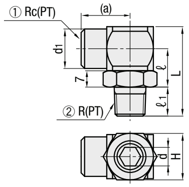
H	d₁	Hexagonal wrench socket ⬡d	L	ℓ	ℓ₁	(a)	① Rc(PT)	② R(PT)	Part Number Type	Part Number No.	U/Price 1~9
19	14	⬡5	36.5	15.75	9.5	16	1/8	1/8	LSNF (Brass)	1	Quotation
	17	⬡6	39.5		12.5	20.5	1/4	1/4		2	
	19		42.5	17.75	13.5	25.5	3/8	3/8		3	
19	14	⬡5	36.5	15.75	9.5	16	1/8	1/8	SUS—LSNF (Stainless steel)	1	
	17	⬡6	39.5		12.5	20.5	1/4	1/4		2	

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower. Keep water temperature under **120**℃.

RoHS

L-shaped Swivel Joints Constant flow type

LSNFM (Brass)



Refer to P.1094 on the difference of inner structure of swivel type.

M Brass (C3604)

Values in ( ) are reference only.

Hexagonal holes bored at the tapered screw②.

Thread JIS B0203 tapered thread for tube $^{R}_{Rc}$ (PT)

H	d₁	Hexagonal wrench socket ⬡d	L	ℓ	ℓ₁	(a)	① Rc(PT)	② R(PT)	Part Number Type	Part Number No.	U/Price 1~9
20	14	⬡6	35.5	16.5	9.5	17	1/8	1/8	LSNFM	1	Quotation
	17	⬡8	38.5		12.5	20.5	1/4	1/4		2	
	19		39.5		13.5	24	3/8	3/8		3	

Use in atmospheric pressure 980kPa (10kgf/cm^2) or lower. Keep water temperature under **120**℃.

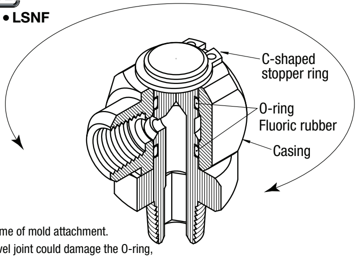
Order **Part Number**
LSNF 2
LSNFM 3

Days to Ship Quotation

Price Quotation

Example

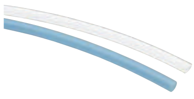
• LSNF



L-shaped Swivel joint is a product for the turn at the time of mold attachment.
Note that intermittent or continuous turning of the swivel joint could damage the O-ring, which results in water leakage.

HOT-WATER TUBES

M—NB RoHS

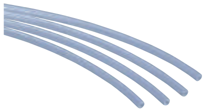


M PA12
Possible temperature of use—15～90℃

M—WE RoHS

M Polyolefine
Operating temperature limit : 0～99℃(Water)
—30～99℃(Air)

M—SFT RoHS



M Fluorine resin
Possible temperature of use—65～180℃

Ext. dia. of tube	Int. dia. of tube	Min. Fix radius	Usable Pressure	Part Number Type	Part Number No.	Full length L (meter)	Color C	U/Price 1～5 L5	L10	L20	L100
4	2.5	14	0～300 kPa (0～3 kgf/cm²)	M—NB	0425	5 10 20 100	B (Blue) W (Milky white)	Quotation			
6	4	21			0640						
8	6	34			0860						
10	7.5	42			1075						
12	9	51			1290						
4	2.5	14		M—WE	0425	5 10 20	W (Milky white)				—
6	4	23			0640						
8	6	40			0860						
10	7.5	50			1075						
12	9	62			1290						
6	4	30	※See the burst pressure table.	M—SFT	0640		C (Transparent)				—
8	6	55			0860						
10	7.5	60			1075						
12	9	80			1290						

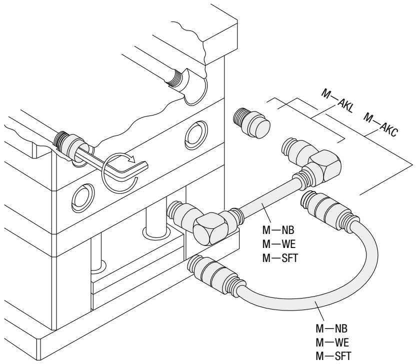
To be quoted on price & lead time above Max. Q'ty.

Order

Part Number	—	L	—	C
M—NB0640	—	5	—	B

Days to Ship Quotation

Example



■Burst pressure table of hot-water tube (M—SFT)

MPa

Part Number \ Temperature	0℃	20℃	40℃	60℃	80℃	100℃	120℃	140℃	160℃	180℃
M—SFT0640	6.6	5.8	5	3.9	3.1	2.9	2.7	2.4	2.2	2
M—SFT0860	4.7	4.1	3.6	2.8	2.2	2.1	1.9	1.7	1.6	1.4
M—SFT1075	4.7	4.1	3.6	2.8	2.2	2.1	1.9	1.7	1.6	1.4
M—SFT1290	4.7	4.1	3.6	2.8	2.2	2.1	1.9	1.7	1.6	1.4

Use it under the pressure of no more than 1/4 of the burst pressure as a rough guide.

・Notes on handling

①Select an appropriate tube in accordance with cooling water temperature.
②The tube can be used for both cooling water and oil. (Water only for M—WE)
③Cut both ends of the tube squarely (at a right angle) to put it into a quick-fitting mold joint or bolting joint-otherwise the tube may come out unexpectedly or cause water leakage.
④Use the special insert sleeve (**Right page**) together with these tubes to connect to a quick-fitting mold joint. Use without an insert sleeve may cause the tube to fall off unexpectedly or result in water leakage.
⑤The higher the temperature rises, the lower the burst pressure of hot-water tube (M—SFT) falls. Use the tube in high temperature after making sure of the burst pressure table above.
⑥When fitting the tube to bolting joints (P.1092) again, fit it after cutting the part fitted before.
Usage without cutting could cause the tube to fall off unexpectedly or result in water leakage.

TUBE CUTTERS / INSERT SLEEVES

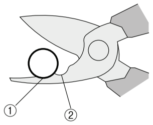
Non JIS material definition is listed on P.1351 - 1352

■Tube Cutter

M—TCN

Part Number	Unit price 1～9	Slide Unit Price 10～19	20～29	30～50
M—TCN		Quotation		

To be quoted on price & lead time above Max. Q'ty.



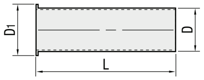
• Features of the Tube Cutters

(1) Using this tube cutter you can cut tubes much easier due to the tube guide R.
Tube guide R ① For large tube cutting (10mm or more)
② For small tube cutting (8mm or less)
(2) This tube cutter is exclusively designed for use with M-WA/M-SFT tubes. Cutting any other tube products or wires may damage the tube cutter blades.
(3) Tube cutters are consumables that need to be replaced as required.

■Insert sleeve (especially for quick-fitting joints for mold cooling)

RoHS

10PACK—M—WR



M SUS304

Applicable tube Ext. Dia.×Int. Dia.	D	D_1	L	Part Number Type	Part Number No.	U/Price 10 PACK
4×2.5	2.5	3	18	10PACK—M—WR	0425	Quotation
6×4	4	4.5	18.5		0640	
8×6	6	6.5	20		0860	
10×7.5	7.5	8	22		1075	
12×9	9	9.5	25		1290	

・Features of the Insert Sleeve

Insert sleeves can prevent plastic tubes from coming loose or causing water leakage by holding them down when they become soft (due to hot water) or contract (due to water absorption by plastics in a prolonged usage).

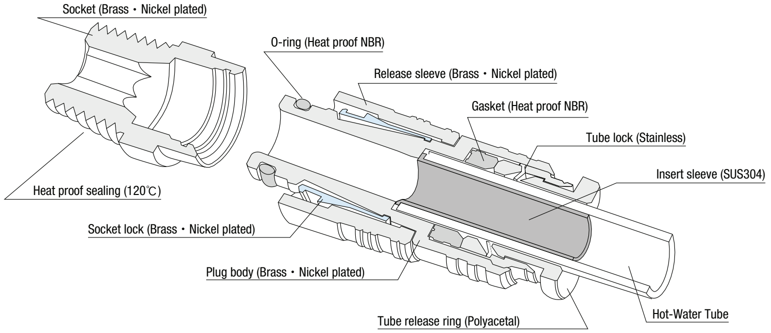
This is an insert sleeve especially for quick-fitting joints for mold cooling. Not applicable for bolting joints (P.1092).

Order

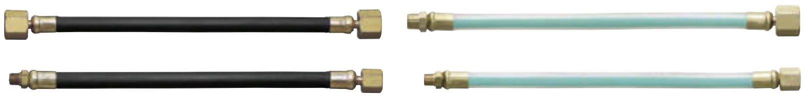
Part Number
10PACK—M—WR0425

Days to Ship Quotation

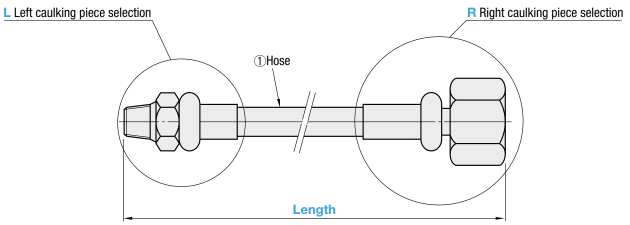
Example


Socket (Brass・Nickel plated)
O-ring (Heat proof NBR)
Release sleeve (Brass・Nickel plated)
Gasket (Heat proof NBR)
Tube lock (Stainless)
Insert sleeve (SUS304)
Heat proof sealing (120℃)
Socket lock (Brass・Nickel plated)
Plug body (Brass・Nickel plated)
Tube release ring (Polyacetal)
Hot-Water Tube

RUBBER HOSES —HEAT RESISTANCE 120℃・150℃—



KGHA (Heat resistance **120**℃: For Water/Oil)
WHSG (Heat resistance**150**℃: For Water)


L Left caulking piece selection
R Right caulking piece selection
①Hose
Length

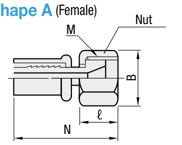
M
① Hose

Type	Internal rubber	Outside rubber	Reinforcing wire
KGHA (Heat resistance **120**℃: For Water and Oil)	Heat and oil-resistant NBR blended rubber	Heat and weather-resistant CR blended rubber	Synthetic fibers
WHSG (Heat resistance**150**℃: For Water)	Silicon rubber	Silicon rubber	High-tension polyester cord

② Caulking piece C3604

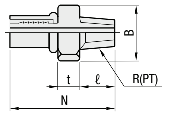
② Profile of caulking piece

Shape A (Female)



Special Plugs
FSHG FSHGR
FSHL FSHLR FSHLS

Shape B (Male)



Part Number Type	No.	Length 50mm increments	L Left caulking	R Right caulking
KGHA (Heat resistance **120**℃: For Water/Oil) **WHSG** (Heat resistance **150**℃: For Water)	1	200~3000	**LA** (Female) **LB** (Male)	**RA** (Female) **RB** (Male)
	2			
	3			

Use a high-temperature dedicated plug (FSHG, FSHGR, FSHL, FSHLR, FSHLS) **P.1108** for the plug connected to an A-shaped caulking piece.

■Specifications of hose Dimensions of caulking piece

Part Number Type	No.	Internal dia. (mm)	External dia. (mm)	Minimum bending radius (mm)	Allowable temperature range	Maximum allowable pressure
KGHA (Heat resistance 120℃: For Water/Oil)	1	6.3	(13)	80	−30~**120**℃	1.5MPa
	2	6.3	(13)	80		
	3	9.5	(16.5)	100		
WHSG (Heat resistance 150℃: For Water)	1	6.3	(12.3)	80	−30~**150**℃	1.0MPa
	2	6.3	(12.3)	80		
	3	9.5	(16)	100		

Order

Part Number	—	Length	—	Shape L	—	Shape R
KGHA2	—	900	—	LA	—	RA

Price Quotation

■Caulking piece dimension

No.	Shape A				Shape B				
	N	ℓ	B(side to side)	M	N	ℓ	t	B(side to side)	R(PT)
1	38	16	16	M12×1.25	35	8.5	5.2	12	1/8
2	43	19	21	M16×1.5	38	9.5	7	14	1/4
3	48	19	24	M20×1.5	43	10.5	7	17	3/8

Days to Ship Quotation

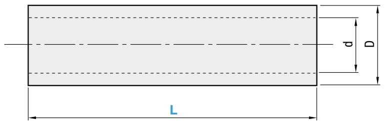
Precautions for use

- Use a high-temperature dedicated plug (FSHG, FSHGR, FSHL, FSHLR, FSHLS) **P.1108** for the plug connected to an A-shaped caulking piece.
- Do not use with any other than a plastic mold.
- The hose expands and contracts when the pressure is increased and reduced, so make the hose a little longer.
- Use the hose within the maximum allowable pressure and also within the allowable temperature range.
- Do not use the hose bent to less than the minimum allowable bending radius, and do not bend it continuously.
  Do not allow the hose to come into contact with a heat source for heating the mold, such as a heater.
- Periodically inspect and replace the hose. Replace the hose if it is cracked, has hardened or is externally damaged.
- Rubber hose is vulnerable to damage, especially WHSG (heat resistance150℃ for water), so handle with care.

RUBBER HOSES FOR HIGH-TEMPERATURE WATER/HOT-WATER HOSES/HOSE BANDS

■Rubber Hose for High-Temperature Water

KGH (Rubber Hose for High-Temperature Water)



Applicable for liquid-water

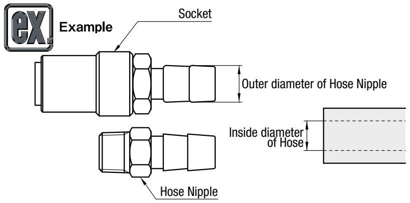
M	Internal/Outside rubber	Reinforcing wire
	Heat resistant synthetic rubber (EPDM)	Aramid fiber

D	d	Part Number Type	No.	L (unit: m)	U/Price 1~9 L1	L2	L5	L10	L20	L30
18	9.7	KGH	3	1 2 5 10 20 30	Quotation					

Maximum allowable pressure MPa (kgf/cm²)	Allowable temperature range ℃	Minimum bending radius mm	Mass kg/m
1.0(10.2)	−30~120	120	0.23

- To be quoted on price & lead time above Max. Q'ty.
- Check the size of the outer diameter of the hose nipple on usage. Although the inside diameter (d) of the hose is 9.7, applicable for hose nipple of outside diameter of between 9.7 and 12mm.

Example



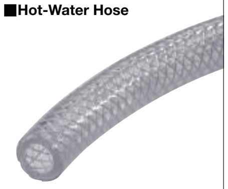
Notes

- When installing the hose nipple, fix it with a hose band (MHBS).
- This product is for warm water use. NEVER use it with oil.
  Also, do not use these hoses in an environment where they are likely to come into contact with oil.
- Inspect the hoses periodically, and if they show signs of cracking, hardening or other changes, replace them.
- The hoses expand or contract depending upon whether they are pressurized or depressurized, so allow a certain margin of length.

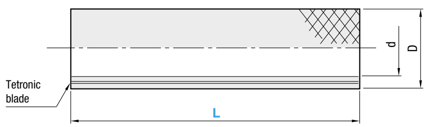
Order Quotation

Days to Ship Quotation

■Hot-Water Hose



MHW (Hot-Water Hose)



Applicable for liquid-water

M Soft vinyl chloride

D	d	Part Number Type	No.	L (unit: m)	U/Price 1~9 L10	L20	L50
13.5	8	MHW	1	10 20 50	Quotation		
18	12		2				
22	15		3				

Part Number	Specifications Allowable Pressure kPa (kgf/cm²)	Destructive pressure kPa (kgf/cm²)	Min. bend radius (room temp.)	Allowable Temperature Range
MHW1	0~1000(0~10)	5500(55)	56	0~60℃
MHW2	0~800(0~8)	4000(40)	84	
MHW3		6000(60)	105	

Order

Part Number	—	L
MHW2	—	10

Price Quotation

Days to Ship Quotation

■Hose Band

MHBT RoHS

M SUS430
Safety cap: PE
Bolt : SWCH10K

External hose (mm) Diameter	Max. tightening torque N・cm {kgf・cm}	Part Number Type	No.	U/Price 1~9
ϕ13~20	350{35}	MHBT	1	Quotation
ϕ18~25			2	

Order

Part Number
MHBT1

Days to Ship Quotation

Price Quotation

■Features MHBT has a safety cap and you are free from concerns to hurt yourself.

VALVELESS TSP COUPLERS FOR COOLING

FOR PRESSURE-RESISTANT HOSE INSERTION—SOCKETS・PLUGS—

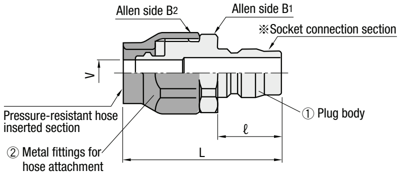
Non JIS material definition is listed on P.1351 - 1352

■Plug

RoHS

MH—TSPN

Plug	No.	Part Number of matching sockets
MH—TSPN	9	MH—TSPS9, F120—TSH3, F120—TSF3
	12	MH—TSPS12, 15F120—TSH4, F120—TSF4
	15	MH—TSPS15, F120—TSH4, F120—TSF4
	19	MH—TSPS19


Allen side B2
Allen side B1
※Socket connection section
V
Pressure-resistant hose inserted section
① Plug body
ℓ
L
② Metal fittings for hose attachment

① Socket body and ② Metal fittings for hose attachment can be detached and attached.

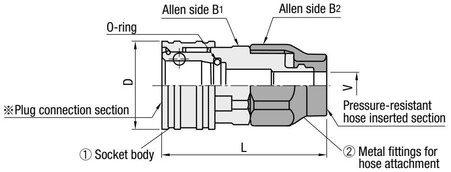
M Brass (C3604)

■Socket

RoHS

MH—TSPS

Socket	No.	Part Number of matching plugs
MH—TSPS	9	MH—TSPN9, F120—TPM3, F120—TPF3
	12	MH—TSPN12, 15F120—TPM4, F120—TPM4
	15	MH—TSPN12, 15, F120—TPM4, F120—TPF4
	19	MH—TSPN19


Allen side B1
Allen side B2
O-ring
D
V
※Plug connection section
Pressure-resistant hose inserted section
L
① Socket body
② Metal fittings for hose attachment

M Brass (C3604)

① Socket body and ② Metal fittings for hose attachment can be detached and attached.

Nitrile rubber (Heat resistance temperature: −20～80℃)

Applicable hose		B1	B2	Wall thickness (mm)	V	L	ℓ	Part Number		U/Price
Int. Dia.	External dia.							Type	No.	1～9
9	15	23	24	3±0.3	8.5	52	21	MH—TSPN	9	Quotation
12	18	27	27		11	60	24		12	
15	22	30	30	3.5±0.35	13	68	24		15	
19	26	35	35		17	76	28		19	

Applicable hose		B1	B2	Wall thickness (mm)	D	V	L	Part Number		U/Price
Int. Dia.	External dia.							Type	No.	1～9
9	15	23	24	3±0.3	28	8.5	54	MH—TSPS	9	Quotation
12	18	29	27		35	11	62		12	
15	22	30	30	3.5±0.35	35	13	70.5		15	
19	26	38	35		45	17	81		19	

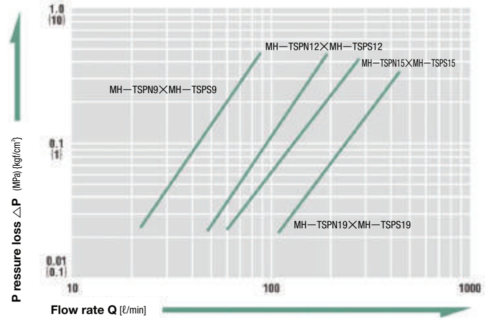
Order
Part Number
MH—TSPN12

Price Quotation

Days to Ship Quotation

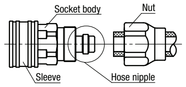
■Characteristic Chart of Flow Rate and Pressure Loss

[Measurement conditions] ●Liquid: Operating oil ●Temperature: 30±5℃
●Kinetic viscosity: 32×10^{-6} m²/s ●Density: 0.87×10^{3} kg/m³



■How to mount the hose to TSP coupler for cooling

1.Remove the nut (metal fitting for hose attachment) from the product, and run the hose through inside the nut. Vertically cut the end face of the hose to be mounted.
2.Insert the hose into the hose nipple of the socket body.
Insert the hose until it contacts the end face of socket body.
3.Tighten until the end face of nut clicks.
*When re-mounting the TSP coupler mounting hose, use the hose after cutting 3cm or more off its end face.


Socket body
Nut
Sleeve
Hose nipple

■Flow direction of liquid

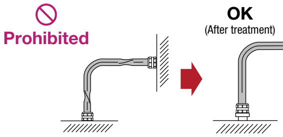
Liquid can flow from either the socket side or the plug side.

Notes on usage of pressure-resistant hose

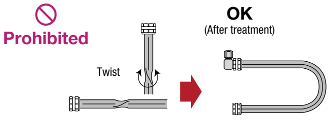
1. MH—TCB joints are specifically used for pressure-resistant hoses MH—TR and MH—TS. Note that if connected with any other hose, the joint may be damaged and the hose may come off.
2. Note that if used in the state that the hose is extremely bent near the joint, the joint may be damaged and the hose may come off. Use within the bending radius larger than the minimum bending radius of hose.
3. Do not use in places of vibration or shock. Note that the joint may be damaged and the hose may come off in such places.

⚠ **Warning** Do not carry out piping or use the hose when it is twisted. If twisted, the inner structure of hose may deform and cause dangerous "cracking". Take appropriate measures referring to the example below.

Example 1) Twisting of hose when piping

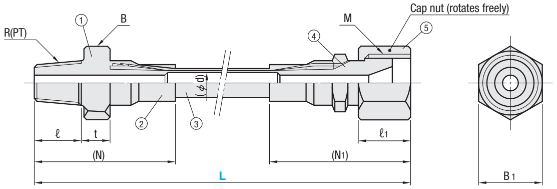

Prohibited
OK
(After treatment)

Example 2) Twisting when bent


Prohibited
Twist
OK
(After treatment)

MOLD-COOLING FLEXIBLE HOSES

FSHP



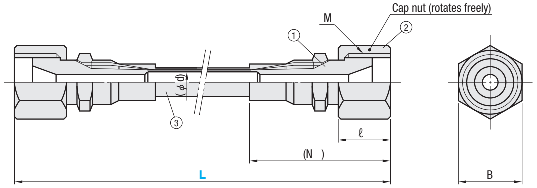
Special Plugs
FSHG FSHGR
FSHL FSHLR FSHLS

M ① Nipple C3604
② Collar C3604
③ Wire braid SUS304
④ Sleeve C3604
⑤ Cap nut C3604

Thread JIS B0203 tapered thread for tube R (PT)

R(PT)	N	ℓ	t	B (side to side)	Internal diameter of Hose φd	M×Pitch	N1	ℓ1	B1	Part Number Type	No.	L 50mm increments	100mm increments	Selection
1/8	34.5	10	6	14	4.70	M12×1.25	41.0	16	16	FSHP (Male and female plugs)	1	200～700	800～1000	1200 1500
1/4	42.0	12	7	17	7.92	M16×1.5	48.0	19	21		2			
3/8	46.5	13	8	19	10.31	M20×1.5	49.5		24		3			

FSHF



Special Plugs
FSHG FSHGR
FSHL FSHLR FSHLS

M ① Sleeve C3604
② Cap nut C3604
③ Wire braid SUS304

Internal diameter of Hose φd	M×Pitch	N	ℓ	B	Part Number Type	No.	L 50mm increments	100mm increments	Selection
4.70	M12×1.25	41	16	16	FSHF (Both ends: Female)	1	200～500	600～1000	—
7.92	M16×1.5	48	18.5	21		2			1200 1500

Order	Part Number — L
	FSHP 1 — 900

Days to Ship **Quotation**

Price **Quotation**

■Features

	This flexible hose is much more flexible than conventional metal flexible hoses. The pipe consists of Teflon which is extrusion-molded and braided tightly, so it has greatly improved impact pressure resistance.
Heat resistance and cold resistance	Can be used continuously at temperature range of −54℃～+200℃. However, this applies only to this product on its own.
Non-absorptive	Teflon® does not absorb moisture, so fluid does not ooze out from the pipe side.
Storage life	Teflon® is small and its life remains unchanged under all weather conditions. ※Teflon® is the product name for polytetrafluoroethylene resin made by the U.S. Dupont corporation. This product uses Dupont's genuine Teflon.

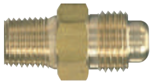
■Specifications

Size	1/8	1/4	3/8
Working pressure (MPa) {kgf/cm²}	10.3{105}	17.2{175}	13.8{140}
Destructive pressure (MPa) {kgf/cm²}	20.6{210}	82.3{840}	55.2{562}
Min. bend radius (mm)	50.0	102	132
Usable temperature range (standalone use)	−54℃～+200℃		
External diameter of hose (mm)	(8.0)	(11.3)	(13.94)
Vacuum application	Unsuitable		

※Values in ( ) are for reference only.

PLUGS FOR HIGH-TEMPERATURE HOSE

Non JIS material definition is listed on P.1351 - 1352

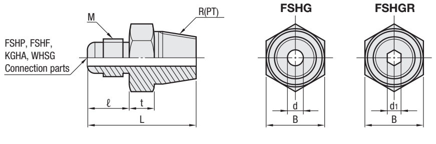


RoHS

FSHG not comform to RoHS.

FSHG (Plugs for WHSG, FSHP, FSHF, KGHA)

FSHGR (Hexagonal hole type)(Plugs for FSHP, FSHF, KGHA, WHSG)

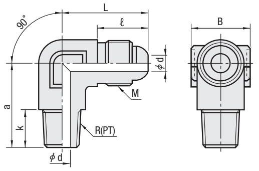


Can be used for FSHP, FSHF, KGHA, WHSG only.

M Brass (C3604)
Thread JIS B0203 tapered thread for tube R(PT)

φd	⬡d1	t	L	ℓ	B	M×Pitch	R(PT)	Part Number Type	No.	U/Price 1～9 FSHG	FSHGR
4	5	6	29	13	14	M12×1.25	1/8	FSHG FSHGR	1	Quotation	
6	6	8	36	15	17	M16×1.5	1/4		2		
9	10	8	36		21	M20×1.5	3/8		3		

FSHL (Plugs for WHSG, FSHP, FSHF, KGHA)



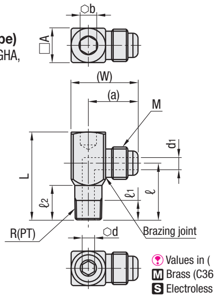
M Brass (C3604)
Thread JIS B0203 tapered thread for tube R(PT)

φd	k	a	L	ℓ	B	M×Pitch	R(PT)	Part Number Type	No.	U/Price 1～9
4	10	22	22	13	14	M12×1.25	1/8	FSHL	1	Quotation
6	13	28	28	15	17.5	M16×1.5	1/4		2	
9	13	33	33	15	21.7	M20×1.5	3/8		3	

RoHS

FSHLR

(Hexagonal hole type)
(Plugs for FSHP, FSHF, KGHA, WHSG)

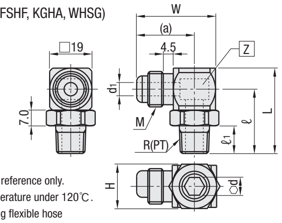


Values in ( ) are reference only.
M Brass (C3604)
S Electroless nickel plated

RoHS

FSHLS

(Plugs for FSHP, FSHF, KGHA, WHSG)



Values in ( ) are reference only.
Keep water temperature under 120℃.
Notes on installing flexible hose
When installing the flexible hose, be sure to use monkey spanner, etc. to hold down "Z"section.

M Brass (C3604)
O-ring (Fluoric rubber)
Thread JIS B0203 tapered thread for tube R (PT)

□A	d1	Hexagonal wrench socket ⬡d	Hexagonal wrench socket ⬡b	L	(W)	ℓ	ℓ1	ℓ2	(a)	R(PT)	M×Pitch	Part Number Type	No.	U/Price 1～9
14	5	6	6	34	28	22	9	13	21	1/8	M12×1.25	FSHLR	1	Quotation
17	6	6	8	43	33	28	11	17	24.5	1/4	M16×1.5		2	

H	d1	Hexagonal wrench socket ⬡d	L	W	ℓ	ℓ1	(a)	R(PT)	M×Pitch	Part Number Type	No.	U/Price 1～9
20	5	6	35.5	33.5	26	9.5	24	1/8	M12×1.25	FSHLS	1	Quotation
	6	8	38.5	35	29	12.5	25.5	1/4	M16×1.5		2	

Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

■Notes

When installing the dedicated plug (FSHG, FSHGR, FSHL, FSHLR, FSHLS) to the cap nut of the flexible hose (FSHP, FSHF) and rubber hoses (KGHA, WHSG), do not use seal material to the dedicated plug side (male screw part) which may cause liquid leakage or damage as the seal tape interrupts the connection of plug and cap nut.

Also, when fastening the dedicated plug by cap nut, half-turn the cap nut slightly from the original position by turning it by hand.Further turning may cause liquid leakage as the sleeve inside the cap nut to be cracked.

Order	Part Number
	FSHG 2 FSHLR 1

Days to Ship **Quotation**

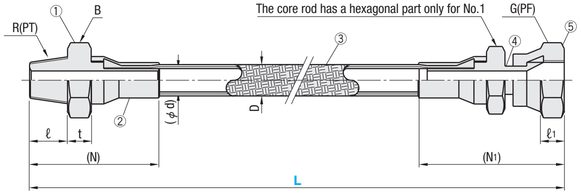
Price **Quotation**

MOLD-COOLING FLEXIBLE HOSES (STAINLESS STEEL)

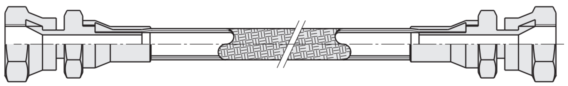
Only SUS—TKMM and SUS—TKMF plugs are applicable to SUS—TKSP and SUS—TKSF

RoHS

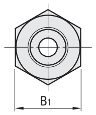
SUS—TKSP (One end male・female)



SUS—TKSF (Both ends female)



Special Plugs
SUS—TKMM SUS—TKMF



M

① Nipple	SUS304
② Collar	
③ Wire braid	
④ Sleeve	
⑤ Cap nut	

Thread JIS B0202 parallel thread for tube G(PF)
JIS B0203 tapered thread for tube R(PT)

R(PT)	(N)	ℓ	t	B (Allen side)	Internal diameter of Hose (ϕ d)	External diameter of hose (D)	G(PF)	(N1)	ℓ1	B1 (Allen side)	Part Number		L
											Type	No.	50mm increments
1/8	40	10	8	14	4.7	7.7	1/8	43	7	14	SUS—TKSP (Male and female plugs) SUS—TKSF (Both ends: Female)	1	200～1000
1/4	45	12	5	14	6.3	9.5	1/4	47	14	17		2	
3/8	49	13	6	19	7.9	11.3	3/8	51	16	21		3	

Order

Part Number	—	L
SUS—TKSP 1	—	900

Price **Quotation**

Days to Ship **Quotation**

■Features

Corrosion resistance This product is made of stainless steel and conforms to RoHS, with excellent resistance to corrosion.

Non-absorptive Teflon® does not absorb moisture, so fluid does not ooze out from the pipe side.

Storage life Unlike a rubber hose, secular change of Teflon® is small and its life remains unchanged under all weather conditions.
※Teflon® is the product name for polytetrafluoroethylene resin made by the U.S. Dupont corporation.
This product uses Dupont's genuine Teflon.

■Specifications

No.	1	2	3
Working pressure (MPa) {kgf/cm^2}	20.58 {210}	20.58 {210}	17.15 {175}
Destructive pressure (MPa) {kgf/cm^2}	96.04 {980}	96.04 {980}	82.32 {840}
Min. bend radius (mm)	51	77	102
Usable temperature range (standalone use)	−54℃～+200℃		

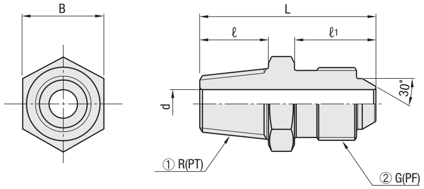
Use SUS—TKSP and SUS—TKSF with care, because the cap nut shape differs from mold-cooling flexible hoses (FSHP, FSHF).
Use special plugs (SUS—TKMM, SUS—TKMF) for SUS—TKSP and SUS—TKSF.
Plugs for high-temperature hose (FSHG, FSHGR, FSHL, FSHLR, FSHLS) cannot be used.

FLEXIBLE HOSE PLUGS (STAINLESS STEEL)

Non JIS material definition is listed on P.1351 - 1352

RoHS

SUS—TKMM (Plugs for SUS—TKSP・SUS—TKSF)



M SUS 304

① R(PT)	② G(PF)	ℓ	ℓ1	d	B	L	Part Number		U/Price
							Type	No.	1～9
1/8	1/8	10	13	4	14	29	SUS—TKMM	11	Quotation
1/4	1/4	12	14	5	14	31		22	
3/8	3/8	13	16	8	19	35		33	

Order

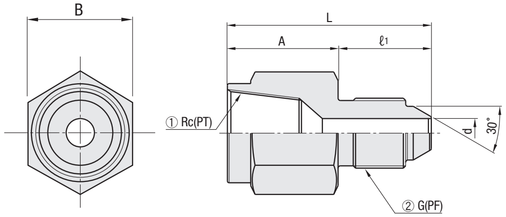
Part Number
SUS—TKMM 22

Price **Quotation**

Days to Ship **Quotation**

RoHS

SUS—TKMF (Plugs for SUS—TKSP・SUS—TKSF)



M SUS 304

① Rc(PT)	② G(PF)	A	ℓ1	d	B	L	Part Number		U/Price
							Type	No.	1～9
1/8	1/8	15	12	4	14	27	SUS—TKMF	11	Quotation
1/4	1/4	17	14	5	17	31		22	
3/8	3/8	19	16	8	21	35		33	

Order

Part Number
SUS—TKMF 22

Price **Quotation**

Days to Ship **Quotation**

■Notes

When installing the dedicated plug (SUS—TKMM, SUS—TKMF) to the cap nut of the flexible hose (SUS—TKSP, SUS—TKSF), do not use seal material to the dedicated plug side (parallel thread for tubing G) which may cause liquid leakage or damage as the seal tape interrupts the connection of plug and cap nut.
Also, when fastening the dedicated plug by cap nut, half-turn the cap nut slightly from the original position by turning it by hand. Further turning may cause liquid leakage as the sleeve inside the cap nut to be cracked.

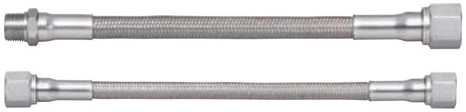
STAINLESS COOLING HOSES FOR MOLD

Mold-Cooling Flexible Hoses (Stainless Steel)

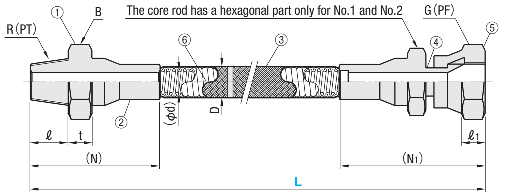
—Heat resistance 180℃ Flexible type—

Only SUS-TKMM and SUS-TKMF plugs are applicable to SUS-TKHP and SUS-TKHF.

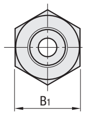
RoHS



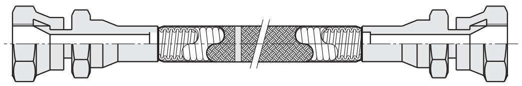
SUS—TKHP (One end male/female)



Special Plugs (P. 1230)
SUS—TKMM
SUS—TKMF



SUS—TKHF (Both ends female)



M Material

① Nipple	SUS304
② Collar	
③ Wire braid	
④ Sleeve	
⑤ Cap nut	
⑥ Hose	PTFE

Thread JIS B0202 parallel thread for tube G(PF)
JIS B0203 tapered thread for tube R(PT)

R (PT)	(N)	ℓ	t	B (Allen side)	Internal diameter of Hose (φd)	External diameter of hose (D)	G (PF)	(N1)	ℓ1	B1 (Allen side)	Part Number Type	Part Number No.	L 10mm increments
1/8	40	9	5	14	7.4	11.3	1/8	47	7	14	SUS—TKHP (Male and female plugs) SUS—TKHF (Both ends female)	1	200～1000
1/4	43	12	5	14	7.4	11.3	1/4	49	8	17		2	
3/8	49	13	6	19	9.5	14.5	3/8	51	16	21		3	

Part Number		Unit price for 1～19 pcs.																
Type	No.	L200～240	L250～290	L300～340	L350～390	L400～440	L450～490	L500～540	L550～590	L600～640	L650～690	L700～740	L750～790	L800～840	L850～890	L900～940	L950～990	L1000
SUS—TKHP (Male and female plugs)	1																	
	2																	
	3								Quotation									
SUS—TKHF (Both ends female)	1																	
	2																	
	3																	

Use SUS—TKHP and SUS—TKHF with care, because the cap nut shape differs from mold-cooling flexible hoses (FSHP, FSHF).
Use the special plugs (SUS—TKMM, SUS—TKMF) for SUS—TKHP and SUS—TKHF.
Plugs for high-temperature hose (FSHG, FSHGR, FSHL, FSHLR, FSHLS) cannot be used.

Order

Part Number	—	L
SUS-TKHP 1	—	900

Days to Ship Quotation

■Specifications

Model Number	SUS—TKHP (Male and female plugs) SUS—TKHF (Both ends female)		
R (PT)	1/8	1/4	3/8
Working pressure (MPa) {kgf/cm²}	2.0 {20}	2.0 {20}	6.86 {70}
Destructive pressure (MPa) {kgf/cm²}	27.44 {280}	27.44 {280}	27.44 {280}
Minimum bending radius	26	26	26
Usable temperature range (standalone use)	−30℃～+180℃		

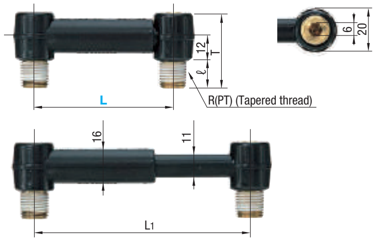
■Features

Bending radius	Compared to the previous stainless steel flexible hoses (SUS—TKSP, SUS—TKSF), the flexible hose has about half the bending radius.
Corrosion resistance	This product is made of stainless steel and conforms to RoHS, with excellent resistance to corrosion.
Non-absorptive	Teflon® does not absorb moisture, so fluid does not ooze out from the pipe side.
Storage life	Unlike a rubber hose, secular change of Teflon® is small and its life remains unchanged under all weather conditions. ※ Teflon® is the product name for polytetrafluoroethylene resin made by the U.S. "Dupont" corporation. This product uses Dupont's genuine Teflon.

UNI-JOINT PLUGS

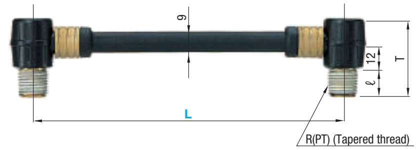
—HEAT RESISTANCE 80℃—

JWRL (Elastic pipe type)



M Main frame Polyacetal resin Thread Brass (C3604)
Thread JIS B0203 thread for tube R(PT)

JWRF (Flexible plastic tube type)



M Main frame Polyacetal resin Tubes Urethane
Thread Brass (C3604)
Thread JIS B0203 thread for tube R(PT)

T	ℓ	R(PT)	Part Number Type	Part Number No.	L	L1	U/Price 1～9
31	9	1/8	JWRL	1	50	65	Quotation
					65	100	
					100	160	
35	12.7	1/4		2	50	65	
					65	100	
					100	160	

T	ℓ	R(PT)	Part Number Type	Part Number No.	L	L1	U/Price 1～9
31	9	1/8	JWRF	1	140	—	Quotation
35	12.7	1/4		2			

Order

Part Number	—	L
JWRL 2	—	65

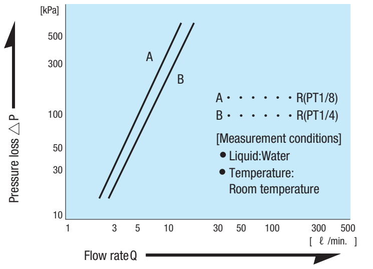
Days to Ship Quotation

Price Quotation

■Specifications

Size	1/8	1/4
Max. tightening torque (N・cm) {kgf・cm}	490 {50}	880 {90}
Working pressure (kPa) {kgf/cm²}	980 {10}	
Maximum pressure (kPa) {kgf/cm²}	1470 {15}	
Usable temperature range	80℃ or lower	
Vacuum application	Unsuitable	

■Characteristic Chart of Flow Rate and Pressure Loss



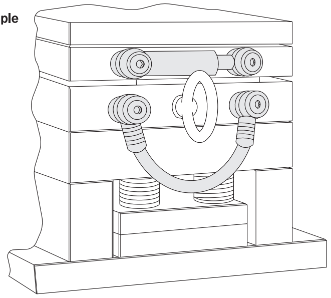
■Features

The JWRL/JWRF Uni-joint Plug is designed for use in mold cooling pipes, and it:
- Requires less piping space.
- Improves productivity of piping work.
- Allows systematic piping.
- Helps reduce mold stocking space.

- **JWRL** (Elastic pipe type)
  The length can be adjusted within the L～L1 range.
- **JWRF** (Flexible plastic tube type)
  The elbows are connected with a flexible tube, making it possible to go around an obstacle between them.
  (Recommended distance between the holes is 100mm or longer.)

<**JWRL** Notes for JWRL Usage>
Use the plugs after 5 to 6 idle rotations with an Allen wrench.
Forcing the elastic pipe to extend without idle rotations may result in water leakage.

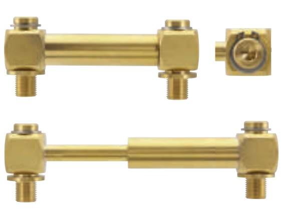
Example



UNI-JOINT PLUGS／HYDRO-CIRCUIT BLOCKS

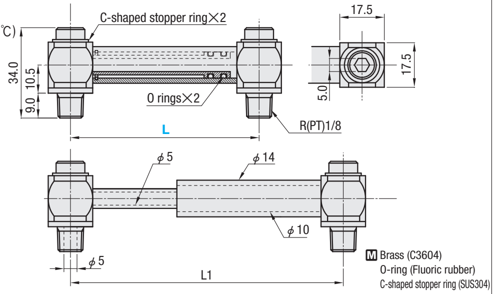
—HEAT PROOF TYPE—

■ Uni-joint plugs



JWRH

(Heat resistance 180℃)

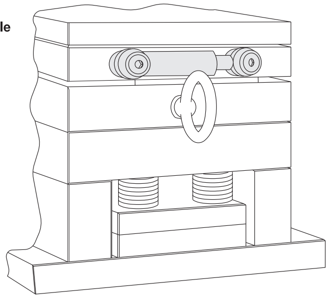

C-shaped stopper ring×2
17.5
34.0
10.5
9.0
5.0
17.5
O rings×2
L
R(PT)1/8
ϕ5
ϕ14
ϕ10
ϕ5
L1

M Brass (C3604)
O-ring (Fluoric rubber)
C-shaped stopper ring (SUS304)

Part Number		L	L1	U/Price
Type	No.			1~9
JWRH	1	50	65	Quotation
		65	100	

Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Example



● Characteristics

The length can be adjusted within the L ～ L1 range.
Heat resistance is 180℃ , and it can be used for both cooling water and oil.

● Notes on handling

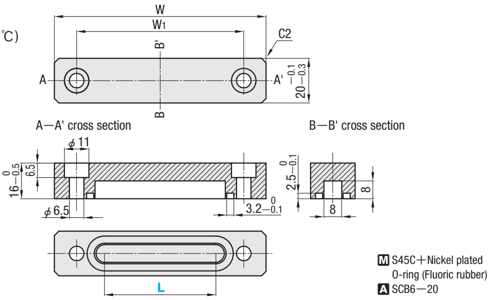
Install it in a balanced manner. The structure have allowance of about 1mm in height difference between right and left. However, if it is off balance, excessive load is applied onto the body, which may lead to water leakage.

■ Hydro-circuit blocks

RoHS

BRJH

(Heat Resistance 180℃)

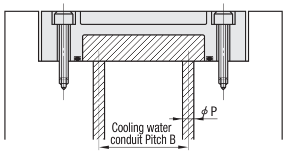

W
W1
C2
B'
A
A'
B
20 −0.1 −0.3
A—A' cross section
B—B' cross section
ϕ11
16 0 −0.5
6.5
2.5 0 −0.1
8
ϕ6.5
3.2 0 −0.1
8
L

M S45C+Nickel plated
O-ring (Fluoric rubber)
A SCB6—20

O-ring Size	W	W1	Part Number		U/Price
			Type	L	1~9
JIS G40	95	75	**BRJH**	50	Quotation
JIS G60	125	105		80	
JIS G75	145	125		100	

Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.

Example


ϕP
Cooling water conduit Pitch B

ϕ P6.0～7.0 is recommended hole diameter.
Heat resistance is 180℃, and it can be used for both cooling water and oil.

Order	Part Number	—	L
	JWRH1	—	65
	BRJH50		

Days to Ship: Quotation

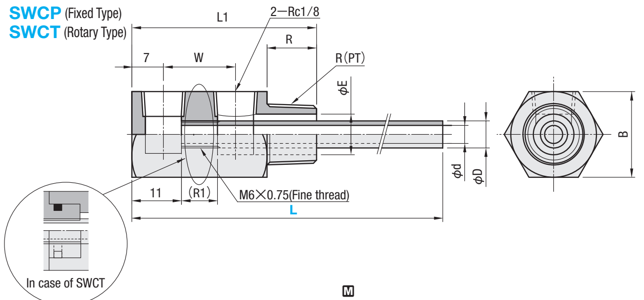
Price: Quotation

SPOT COOLING PIPES

Non JIS material definition is listed on P.1351 - 1352

■ SPOT COOLING PIPES

SWCP (Fixed Type)
SWCT (Rotary Type)


L1
2−Rc1/8
R
7
W
R(PT)
ϕE
B
ϕd
ϕD
11
(R1)
M6×0.75(Fine thread)
L
In case of SWCT

Rotary structure allows for changing the position of the hole on the left freely.

- O−ring (fluoric rubber) is used inside the SWCT only.
- Rotary joint of the SWCT is specially structured so cannot be disassembled.

M

Part Number	Joint	Pipe
SWCP11	Brass (C3604)	SUS304 (Threaded part one-point attachment)
SWCP12		Brass (C2700)
SWCT12		

B	L1	W	ℓ	(ℓ1)	R(PT)	ϕE	ϕD	ϕd	Category	Part Number		L	U/Price 1 ～ 9				
										Type	No.		L100	L200	L300	L400	L500
17	38	16	8	8	1/8	6.2	3	2.5	Static type	SWCP	11	300	Quotation				
19	41		11		1/4	9	6	4			12	100 ～ 500 (100mm increments)					
	46	21		10					Rotary type	SWCT	12						

Order	Part Number	—	L
	SWCP12	—	200

Days to Ship: Quotation

Price: Quotation

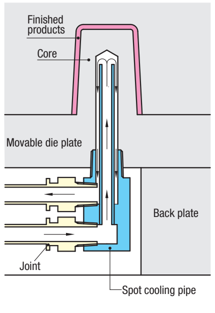
Notes on handling

- Pipes are removable type. Cut it when necessary.
- Note that intermittent or continuous turning of the rotary part of the SWCT could damage the O−ring, which results in water leakage.
- Use in atmospheric pressure 980kPa (10kgf/cm²) or lower.
- Use water and/or oil at temperature of 180℃ or lower.
- They may interfere depending upon size of 2 joints and nipple, etc. to use.

Example

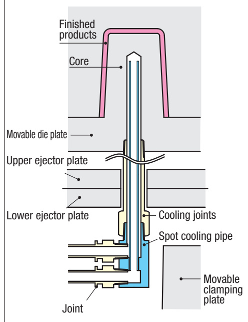
■Vertical use

① Backup plate undercut


Finished products
Core
Movable die plate
Back plate
Joint
Spot cooling pipe

Partial cooling is possible without mechanical processing of coolant hole from horizontal directions.

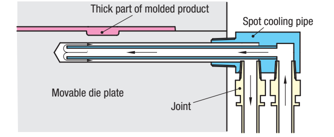
② Clamping plate undercut


Finished products
Core
Movable die plate
Upper ejector plate
Lower ejector plate
Cooling joints
Spot cooling pipe
Movable clamping plate
Joint

By using cooling joint (JTW, etc.), cooling pipe mechanism can be attached from the clamping plate.

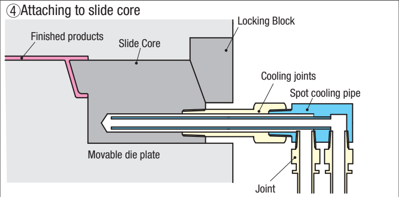
■Horizontal use

③ Attaching to cavity


Thick part of molded product
Spot cooling pipe
Movable die plate
Joint

Partial cooling from horizontal directions is possible if cooling of partially-thick part is difficult.

④ Attaching to slide core

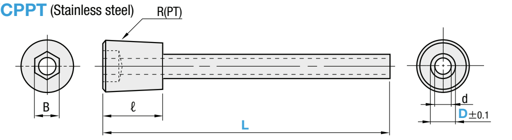

Locking Block
Finished products
Slide Core
Cooling joints
Spot cooling pipe
Movable die plate
Joint

When used for cooling of slide core, it can prevent heat expansion and scraping troubles while shortening the cooling cycle.

COOLING PIPES

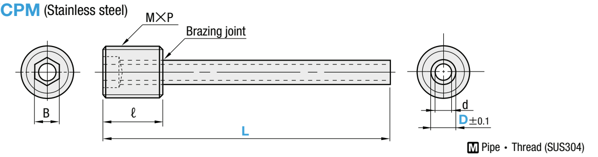
— TAPERED SCREW TYPE ／ PARALLEL SCREW TYPE ／ BRASS・STAINLESS STEEL TYPE —

WCPPT (Stainless steel)



M Pipe・Thread (SUS304)

WCPM (Stainless steel)



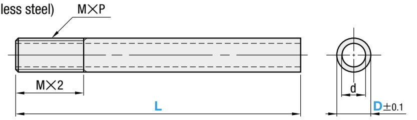
M Pipe・Thread (SUS304)

R(PT)	M×Pitch	B		ℓ		d		Part Number		L	U/Price 1~19	
WCPPT	WCPM	WCPPT	WCPM	WCPPT	WCPM	WCPPT	WCPM	Type	D		WCPPT	WCPM
1/8	M 6×1.0	5	3	7	6	1.6		WCPPT (Stainless steel)	2	150	Quotation	
										200		
	M 8×1.25		4		8	2.5			3	200		
								WCPM (Stainless steel)		250		
						3.6			4	200		
										300		

RoHS

WCP not conform to RoHS.

WCP (Brass)
WCSP (Stainless steel)



Screw part of WCP・WCSP is fine thread.

- **WCP**
M Brass (C3604)
- **WCSP**
M Stainless steel (SUS304)

M×Pitch (Fine thread)	d	Part Number		L		U/Price 1~19	
		Type	D			WCP	WCSP
M3×0.35	1.0	WCP (Brass) WCSP (Stainless steel)	3	50	100	Quotation	
				150	200		
M4×0.5	2.0		4	50	100		
				150	200		
M5×0.5	3.0		5	50	100		
				150	200		
				250	300		
M6×0.75	4.0		6	50	100		
				150	200		
				250	300		
M8×0.75	5.0		8	50	100		
				150	200		
				250	300		
M10×1.0	7.0		10	50	100		
				150	200		
				250	300		

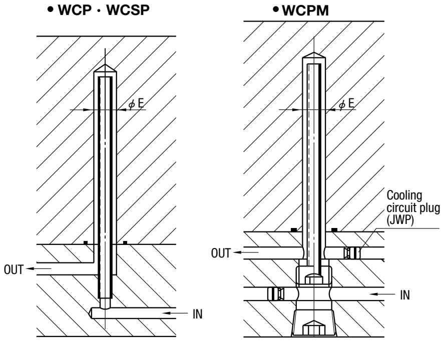
Order

Part Number	—	L
WCPPT3	—	200
WCSP 6	—	150
WCPM 2	—	150

Days to Ship Quotation

Price Quotation

Example



- WCP・WCSP
- WCPM

Refer to the example on the right page for recommended φE.

COOLING PIPES

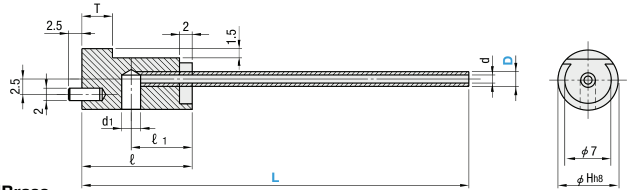
— DOWEL PIN TYPE ／ FLANGE TYPE —

Non JIS material definition is listed on P.1351 - 1352

WCPS specifications have been changed to WCPST.

■Stainless Steel

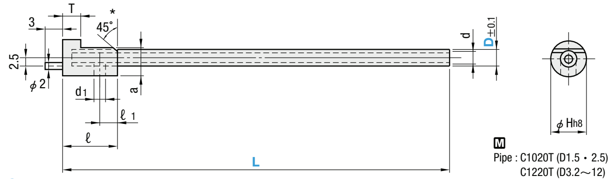
WCPN (Dowel pin type)



M SUS 316

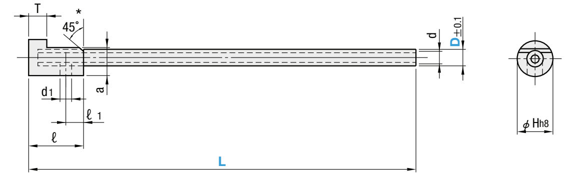
■Brass

WCPNT (Dowel pin type)



M
Pipe : C1020T (D1.5・2.5)
C1220T (D3.2~12)
Holder : Brass (C3604)

WCPST (Flange type)



*When D=10・12, 45° is not processed.
*As distinct from WCPS, WCPST uses brazing for the pipe holder connection method.

M Pipe: C1220T
Holder: C3640

φHh8		T	ℓ1	ℓ	d1	a	d	Part Number			L	U/Price 1~4		
								Type		D		WCPN (D≦3.2)	WCPNT	WCPST (D≧4)
								Stainless Steel	Brass					
10	0 −0.022	4	10	18	3	8.5	0.9	WCPN(D≦3.2) (Dowel pin)	WCPNT (Dowel pin) WCPST(D≧4) (Flange)	1.5	150	Quotation		
							1.5			2.5	150			
							2.2(2.0)			3.2	200			
		5.1			3.5	7.2	3	—		4	200			
12	0 −0.027				5.4	9.5	5			6	300			
15		5.6	11	20	6.5	12	6			8	300			
18				22	8.5	11	8			10	350			
22	0 −0.033				10.5	14	10			12	350			

WCPNT is dimension in ( ).

Order

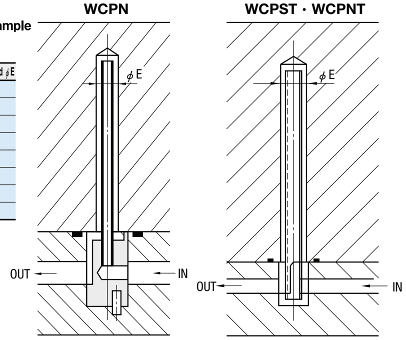
Part Number	—	L
WCPN1.5	—	150
WCPNT2.5	—	150
WCPS4	—	200

Days to Ship Quotation

Price Quotation

Example

D	Recommended φE
1.5~2	4~5
2.5	5~6
3~3.2	6~7
4~5	8
6	10
8	12
10	16
12	20



WCPN

WCPST・WCPNT

COOLING PIPES

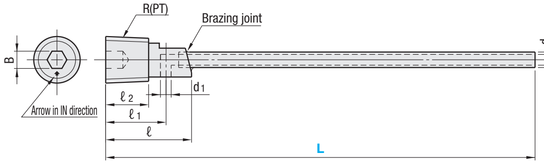
— BRAZING JOINT・TAPERED SCREW TYPE ／ PARALLEL SCREW・CAULKING TYPE —

BAFFLE BOARDS

— TAPERED SCREW PLUG TYPE —

Non JIS material definition is listed on P.1351 - 1352

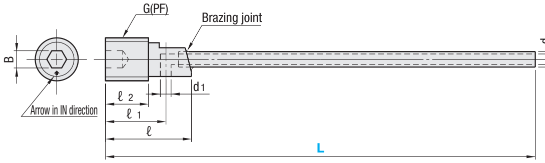
WCPFT (Taper pipe thread type)


R(PT)
Brazing joint
B
Arrow in IN direction
ℓ2
ℓ1
ℓ
d1
L
d
D
C
D1

M Pipe: Stainless steel (SUS304)
Holder : Brass (C3604)
S Holder: Ni plating

・Thread JIS B0203 parallel thread for tubing R(PT)

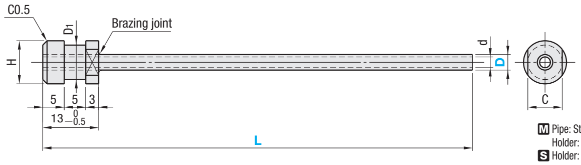
WCPF (Parallel pipe thread type)


G(PF)
Brazing joint
B
Arrow in IN direction
ℓ2
ℓ1
ℓ
d1
L
d
D
C
D1

M Pipe: Stainless steel (SUS304)
Holder: Brass (C3604)
S Holder: Ni plating

・Thread JIS B0203 parallel thread for tubing G(PF)

WCPK (Caulking type)


C0.5
D1
Brazing joint
H
5
5
3
13 $^{0}_{-0.5}$
L
d
D
C

M Pipe: Stainless steel (SUS304)
Holder: Brass (C3604)
S Holder: Ni plating

R(PT) WCPFT	G(PF) WCPF	B	ℓ	ℓ1	ℓ2	C	D1	d1	d	Part Number Type	D	L	U/Price 1～19 WCPFT	WCPF
1/8	1/8	4	20	13	10	6.7	8	1.6	1.6	WCPFT (Taper pipe thread type) WCPF (Parallel pipe thread type)	2	100	Quotation	
												200		
								2.5	2.5		3	100 200		
												300		
1/4	1/4	5	23	15	12	8.5	10	3.6	3.6		4	200		
												300		

H	D1	C	d	Part Number Type	D	L	U/Price 1～19
8	6	6	1.6	WCPK (Cauking type)	2	100	Quotation
						200	
			2.5		3	100 200	
						300	
10	8	8	3.6		4	200	
						300	

Order

Part Number	—	L
WCPF2	—	200
WCPK3	—	200

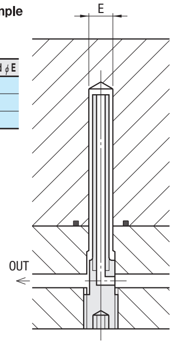
Days to Ship Quotation

Price Quotation

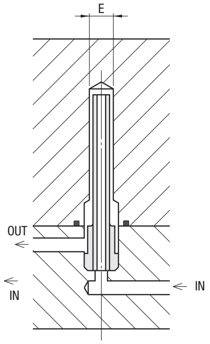
Example

D	Recommended φE
2	5
3	6
4	8

・**WCPF**

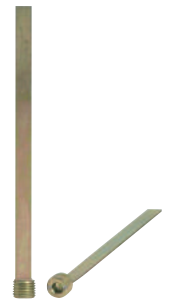


・**WCPK**

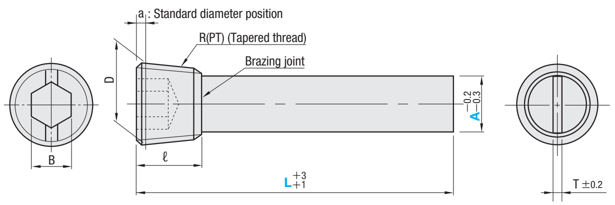


■ Notes on handling of WCPFT and WCPF

- The threaded part of WCPFT is a tapered pipe thread (R, PT), and the threaded part of WCPF is a parallel pipe thread (G, PF).
- The tapered pipe thread and the parallel pipe thread are of the same size and pitch, so be careful when making a screw hole. If you install a tapered pipe thread in a parallel pipe thread hole, water leakage will occur. Also, note that a parallel pipe thread does not fit into a tapered screw hole.
- When using WCPFT and WCPF, use sealing tape.



BFPT


a : Standard diameter position
R(PT) (Tapered thread)
Brazing joint
D
B
ℓ
L$^{+3}_{+1}$
A$^{-0.2}_{-0.3}$
T ±0.2

・Thread JIS B0203 tapered thread for tubing R(PT)
M S45C＋Galvanizing
H 32 42HRC

・Flat board
M Brass (C3604)＋Galvanizing

D	a	No. of threads	Pitch	ℓ	B	R(PT)	T	Part Number Type	A	L 5mm increments
9.728	0.45	28	0.91	7	5	1/8	1.5	BFPT	6	30～200
									8	
13.157	0.7	19	1.34	8.9	6	1/4	2.0		9	30～250
									10	
16.662				10	8	3/8			12	30～300
									14	

Make the water hole diameter to which BFPT is fitted at least 1mm-larger than A.

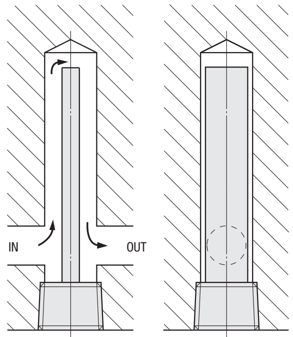
Order

Part Number	—	L
BFPT8	—	100

Days to Ship Quotation

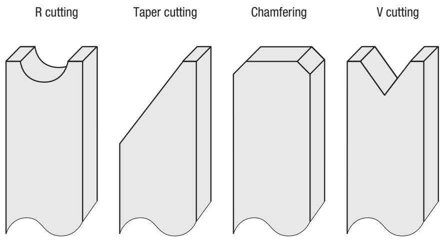
Price Quotation

Example



・Adjust turning direction of the baffle board by winding shim tapes around and tightening.

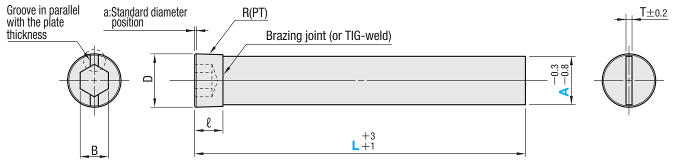
・**Example of baffle board processing**


R cutting
Taper cutting
Chamfering
V cutting

STAINLESS STEEL BAFFLE BOARDS

—TAPERED SCREW PLUG TYPE—

BFPTS


Groove in parallel with the plate thickness
a:Standard diameter position
R(PT)
Brazing joint (or TIG-weld)
T±0.2
D
A −0.3 −0.8
ℓ
B
L +3 +1

- Thread JIS B0203 tapered thread for tubing R(PT)
  Ⓜ Stainless steel (SUS304)
- Flat board
  Ⓜ Stainless steel (SUS304)

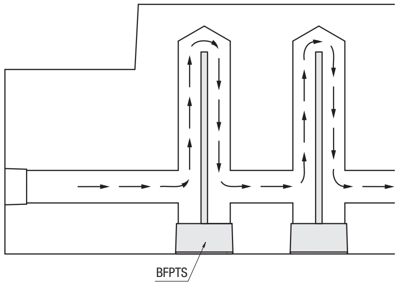
T	D (Reference)	a	ℓ	B	R(PT)	Part Number Type	Part Number A	L 5mm increments
3	21.0	0.9	12	10	1/2	BFPTS	18	50～600
	26.4		14	14	3/4		20	
							24	
	33.2	1.1	17	17	1		30	

P Price **Quotation**

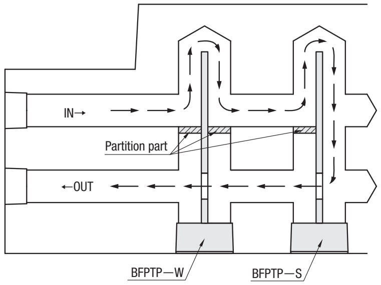
Order **Quotation**

Days to Ship **Quotation**

ex Example



Because the baffle board is made of stainless steel it does not easily rust. Also, because it is integral with the tapered screw plug, maintenance is easy.


IN→
Partition part
←OUT
BFPTP—W
BFPTP—S

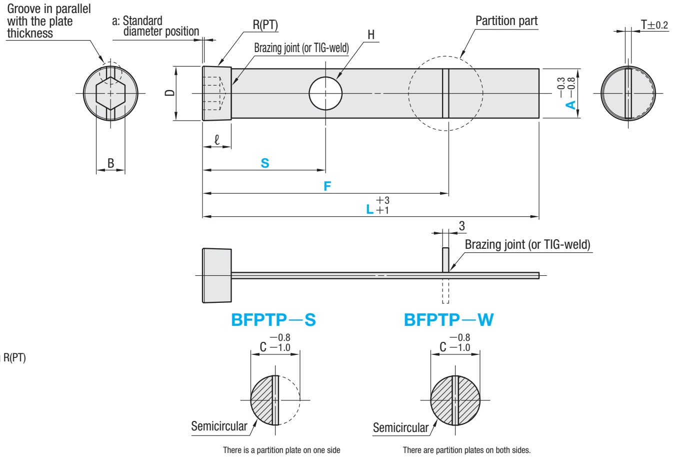
If there is an ejector pin or an oblique slide blocking the cooling water hole (transverse hole), partition the inside of the longitudinal water hole, and make a hole mid-way along the baffle board. This will result in a structure in which IN and OUT are in the same plane.

STAINLESS STEEL BAFFLE BOARDS WITH PARTITION FUNCTION

—TAPERED SCREW PLUG TYPE—

Non JIS material definition is listed on P.1351 - 1352

BFPTP—S (One-sided partition)
BFPTP—W (Two-sided partition)


Groove in parallel with the plate thickness
a: Standard diameter position
R(PT)
Brazing joint (or TIG-weld)
H
Partition part
T±0.2
D
A −0.3 −0.8
ℓ
B
S
F
L +3 +1
3
Brazing joint (or TIG-weld)
BFPTP—S
BFPTP—W
C −0.8 −1.0
C −0.8 −1.0
Semicircular
Semicircular
There is a partition plate on one side
There are partition plates on both sides.

- Thread JIS B0203 tapered thread for tubing R(PT)
  Ⓜ Stainless steel (SUS304)
- Flat board
  Ⓜ Stainless steel (SUS304)
- Partition board
  Ⓜ Stainless steel (SUS304)

T	D (Reference)	a	ℓ	B	R(PT)	H	C	Part Number Type	Part Number A	L 10mm increments	F 10mm increments	S 10mm increments
3	21.0	0.9	12	10	1/2	11	18	BFPTP—S (One-sided partition) BFPTP—W (Two-sided partition)	18	100～600	50～590	30～(F—10)
	26.4		14	14	3/4	12	20		20			
						16	24		24		60～590	40～(F—10)
	33.2	1.1	17	17	1	18	30		30			

Set the water hole and the partition plate so that they are at least 10mm apart. ($S \leqq F - \frac{H}{2} - 13$)

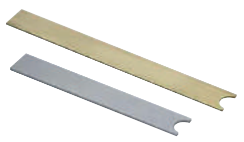
Order

Part Number	—	L	—	F	—	S
BFPTP—S 20	—	500	—	F400	—	S100

Days to Ship **Quotation**

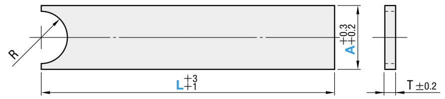
P Price **Quotation**

BAFFLE BOARDS
— R-CUT TYPE —



Part Number	M
BFPXR	Brass (C3604)
BFAPR	Aluminum (A5052P)

—R-cut type—



R
L+3 +1
A+0.3 +0.2
T ±0.2

T	R	Part Number		L 10mm increments	U/Price 1～4					
					BFPXR			BFAPR		
		Type	A		L50～100	L110～150	L160～200	L50～100	L110～150	L160～200
2.0	4	BFPXR (Brass) BFAPR (Aluminum)	10	50～200	Quotation					
			12							
	5		16							
			18							
3.0			20							
	8		22							
			24							
			25							
	11		28							
			30							
			35							

Order

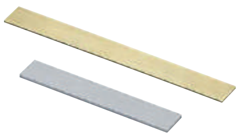
Part Number	—	L
BFPXR 20	—	200

Price Quotation

Days to Ship Quotation

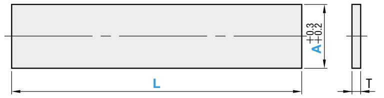
BAFFLE BOARDS
— BLANK TYPE —

Non JIS material definition is listed on P.1351 - 1352



Part Number	M
BFP	Brass (C3604)
BFAP	Aluminum (A5052P)

—Blank Type—



T	Part Number		L (Selection)					
	Type	A	50	100	150	200	250	300
1.5	BFP (Brass)	6	○	○	○	○	—	—
		8	○	○	○	○	—	—
2.0		10	○	○	○	○	—	—
		12	○	○	○	○	○	○
		14	○	○	○	○	○	○
		16	○	○	○	○	○	○
		18	○	○	○	○	○	○
3.0		20	○	○	○	○	○	○
		22	○	○	○	○	○	○
		24	○	○	○	○	○	○
		25	○	○	○	○	○	○
		28	○	○	○	○	○	○
		30	○	○	○	○	○	○
		35	○	○	○	○	○	○
1.5	BFAP (Aluminum)	6	○	○	○	○	—	—
		8	○	○	○	○	—	—
2.0		10	○	○	○	○	—	—
		12	○	○	○	○	○	○
		16	○	○	○	○	○	○
		18	—	○	○	○	—	○
3.0		20	○	○	○	○	○	○
		22	○	—	○	—	○	—
		24	—	—	—	—	○	○
		25	—	—	○	○	○	○
		30	—	○	○	○	—	○

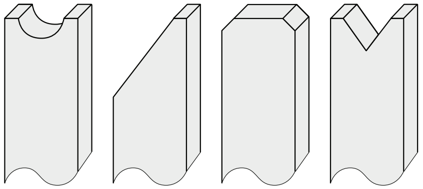
Order

Part Number	—	L
BFAP 10	—	100

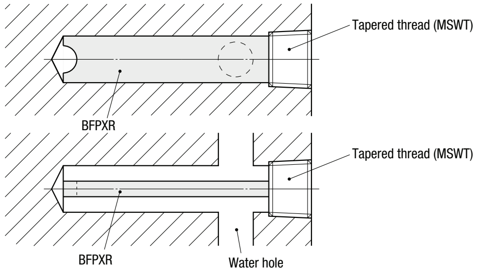
Days to Ship Quotation

Price Quotation

Example ・Example of baffle board processing



R cutting
Taper cutting
Chamfering
V cutting



Tapered thread (MSWT)
BFPXR
Tapered thread (MSWT)
BFPXR
Water hole

We recommend that the baffle board be lightly press–fitted into the cooling hole to prevent rotating.

GUIDE FOR SPIRAL BAFFLE BOARDS

■Characteristics of Spiral Baffle Boards

- Cooling water in spirals can cool down the core more efficiently than those on normal baffle boards.
- Since it is plastic, rust will not be plugged in the cooling water path.
- It can be cut (including tip shape) to fit into cooling space. On the other hand, it does not bend easily since it includes glass fiber (Pull strength about 490N/mm^2{50kgf/mm^2}).

■Notes

Water leakage sometimes occurs even when the baffle boards are installed according to the recommended dimensions in the below installation hole forming example.

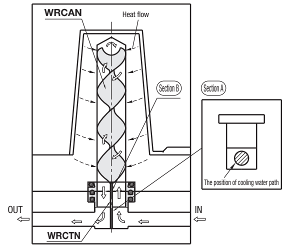
Conceivable causes are as follows.

- Deformation of the mounting board
- Large distance between the fixing position of the mounting board and the spiral baffle board (The retaining force is reduced.)
- Random variations between O-rings

In such a case, increase the number of fixing points and also seal the periphery of the mounting location using an O-ring, for example. Make the mounting hole somewhat shallower than the recommended value, and perform adjustment using additional forming, for example.

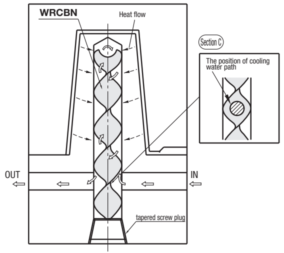
■Example of Using Spiral Baffle Boards

Separate type (WRCAN−WRCTN)


WRCAN
Heat flow
Section B
Section A
The position of cooling water path
OUT
IN
WRCTN

- Install partition section of WRCTN in vertical direction against cooling space. (refer to section A)
- Install partition sections of WRCAN and WRCTN in identical direction. (refer to section B)

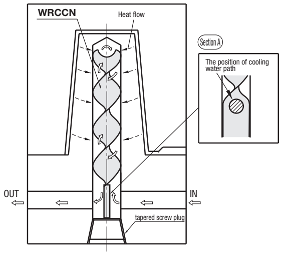
Straight type (WRCBN)


WRCBN
Heat flow
Section C
The position of cooling water path
OUT
IN
tapered screw plug

- Install WRCBN in vertical direction against cooling water. (refer to section C)

Cooling effect declines if it is not in vertical direction against cooling water.

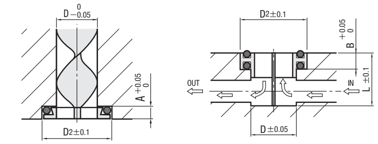
Straight type (WRCCN)


WRCCN
Heat flow
Section A
The position of cooling water path
OUT
IN
tapered screw plug

- Install plate section (section A) of WRCCN in vertical direction against cooling water. (refer to section A)

■Example of Installation Hole Addition (Recommended value)

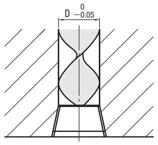
Separate type (WRCAN/WRCTN)


D $^{0}_{-0.05}$
A $^{+0.05}_{0}$
D2±0.1
D2±0.1
B $^{+0.05}_{0}$
OUT
IN
L ±0.1
D ±0.05

Part Number Type	D	Addition method D2	A
WRCAN	8	15	4.2
	10	18	
	12	22	
	16	25	
	20	30	
	25	35	

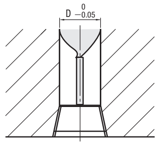
Part Number Type	D	Addition method D2	B
WRCTN	8	15	4.5
	10	18	
	12	22	
	16	25	
	20	30	
	25	35	

Straight type (WRCBN)



Part Number Type	D	Recommended tapered screw plugs
WRCBN	8	MSWT1(PT1/8)
	10	MSWT2(PT1/4)
	12	MSWT3(PT3/8)
	16	MSWT4(PT1/2)
	20	MSWT6(PT3/4)
	25	MSWT6(PT3/4)

Straight type (WRCCN)



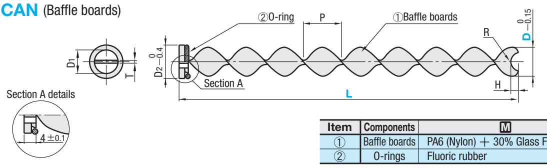
Part Number Type	D	Recommended tapered screw plug
WRCCN	8	MSWT1(PT1/8)
	10	MSWT2(PT1/4)
	12	MSWT3(PT3/8)
	16	MSWT4(PT1/2)
	20	MSWT6(PT3/4)
	25	MSWT6(PT3/4)

SPIRAL BAFFLE BOARDS

—SEPARATE TYPE／STRAIGHT TYPE—

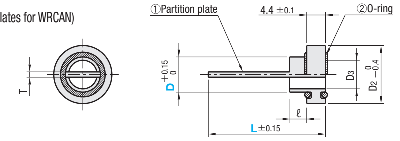
Separate type

WRCAN (Baffle boards)


②O-ring
P
①Baffle boards
R
D $^{0}_{-0.15}$
D1
D2 $^{0}_{-0.4}$
T
Section A
H
L
Section A details
4 ±0.1

Item	Components	M	No. of pieces
①	Baffle boards	PA6 (Nylon) ＋ 30% Glass Fiber	1
②	O-rings	Fluoric rubber	1

WRCTN (Partition plates for WRCAN)

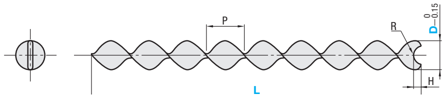

①Partition plate
4.4 ±0.1
②O-ring
T
D $^{+0.15}_{0}$
D3
D2 $^{0}_{-0.4}$
ℓ
L±0.15

Use it with WRCAN as a set.

Item	Components	M	No. of pieces
①	Partition plate	PA6 (Nylon) ＋ 30% Glass Fiber	1
②	O-rings	Fluoric rubber	2

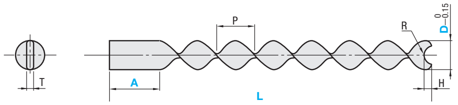
Straight type

WRCBN



M PA6 (Nylon) ＋ 30% Glass Fiber

WRCCN


P
R
D $^{0}_{-0.15}$
T
A
H
L

M PA6 (Nylon) ＋ 30% Glass Fiber

■Separate Type

D1	D2	T	R	H	P	Components ② O-rings	Part Number Type	D	L Selection	U/Price 1～9 L100	L200	L300	L400
8	15	1.5	2	2	20	P10	WRCAN (Baffle boards)	8	100 200 300	Quotation			
10	18	1.8	2.5	2.5		P12		10					
11	22	2	3	3	25	P16		12					
15	25	3	4	4		P20		16					
18	30		5	5		AS119		20					
25	35	3.5	6	6		AS121		25	100 200 300 400				

D3	D2	T	ℓ	Components ② O-rings	Part Number Type	D	L Selection	U/Price 1～9
6	15	1.2	4.1	P 8	WRCTN (Partition plates)	8	25 30 35 40	Quotation
8	18	1.5		P10		10		
10	22	1.6	6.0	P12		12		
13	25	2		P16		16		
17	30			P20		20		
22	35	2.4		AS119		25		

■Straight type

R	H	P	Part Number Type	D	L Selection	U/Price 1～9 L96	L196	L296	L396
2	2	20	WRCBN	8	96 196 296	Quotation			
2.5	2.5			10					
3	3	25		12					
4	4			16					
5	5			20					
6	6			25	96 196 296 396				

T	R	H	P	Part Number Type	D	L Selection	A	U/Price 1～9 L100	L200	L300	L400
1.5	2	2	20	WRCCN	8	100 200	34	Quotation			
1.8	2.5	2.5			10						
2	3	3	25		12		42				
3	4	4			16						
3	5	5			20	100	42				
						200 300	42 92				
3.5	6	6			25	100	42				
						200 300 400	42 92				

Keep water temperature under 80℃.

Order

Part Number	—	L	—	A
WRCAN 16	—	200		
WRCCN 20	—	100	—	A42

Quotation

P Quotation

GUIDE FOR HEAT TRANSACTION PIPES

■Features of WHP Heat Transaction Pipes

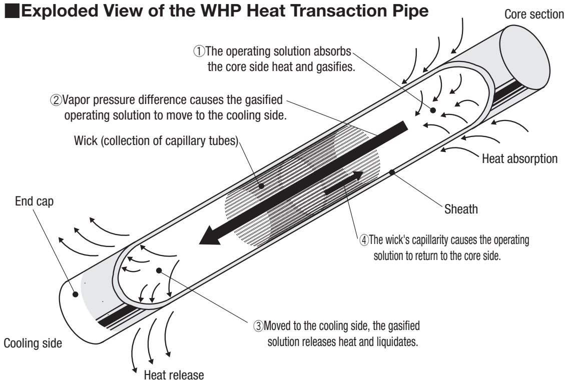
1.High level of cooling performance

The WHP Heat Transaction Pipe uses an operating solution as heat exchange medium instead of thermal conductive materials. This results in a high level of thermal conductivity (200 times higher than a copper rod) and response.

2.Stable cooling effects.

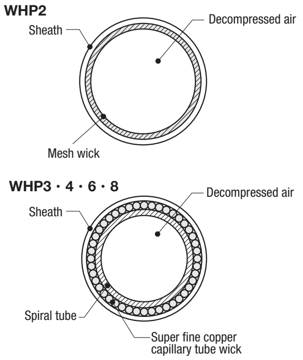
Unlike conventional methods using baffle boards or cooling pipes, the WHP Heat Transaction Pipe is less likely to cause cooling efficiency drop due to water flow reduction caused by rust and fur, and does not cause water boiling problems. These features contribute to reduction of maintenance work.

■Exploded View of the WHP Heat Transaction Pipe

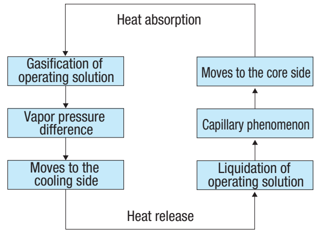

Core section
①The operating solution absorbs the core side heat and gasifies.
②Vapor pressure difference causes the gasified operating solution to move to the cooling side.
Wick (collection of capillary tubes)
Heat absorption
End cap
Sheath
④The wick's capillarity causes the operating solution to return to the core side.
③Moved to the cooling side, the gasified solution releases heat and liquidates.
Cooling side
Heat release

■Cross section

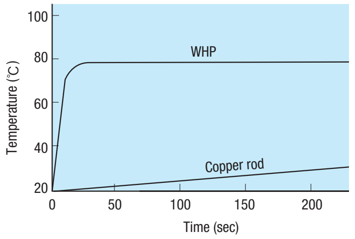
※Wick is a collection of capillary tubes.


WHP2
Sheath
Decompressed air
Mesh wick
WHP3・4・6・8
Sheath
Decompressed air
Spiral tube
Super fine copper capillary tube wick

■Operating Cycle of the WHP Heat Transaction Pipe


Heat absorption
Gasification of operating solution
Vapor pressure difference
Moves to the cooling side
Moves to the core side
Capillary phenomenon
Liquidation of operating solution
Heat release

■Thermal Response Property



<Testing conditions>

- Heating medium: Hot water (80℃)
- Cooling medium: Air (room temperature)
- Heating/cooling section size: 1 vs. 1(equal)
- Measured location: Cooling section
- Pipe size: ϕ4 L105

■Thermal Conductivity

Unit kcal/h

Part Number		L						
Type	D	35	40	45	50	55	60	65
WHP	2	16.5	15.5	14.5	13.5	12.5	11.6	11
	3	—	36.5	35.4	34.5	33.6	32.6	31.8
	4	—	—	—	110	101	93	86.2
	6	310	280	250	230	210	192	175
	8	420	380	340	310	280	260	240

Unit kcal/h

Part Number		L							
Type	D	75	85	105	125	145	165	205	225
WHP	2	9.5	8.2	6	5.6	5.2	—	—	—
	3	30	28	25.8	23.2	20.6	—	—	—
	4	80.8	74.7	68.8	61.9	53.3	41.7	37.8	37.0
	6	160	145	130	118	109	102	95	89
	8	221	203	180	—	—	—	—	—

■Notes

①Use under a temperature of 200℃ or lower. (Burst temperature 250℃) It is designed to withstand an internal pressure up to 20kgf/cm²(For example, the internal pressure rises to 16kgf/cm² at 200℃).

②If the cooling section area is insufficient, proper cooling effects may not be obtained. Provide a water cooling jacket referring to mounting method, and secure the cooling section area.

③Do not cut or disassemble.

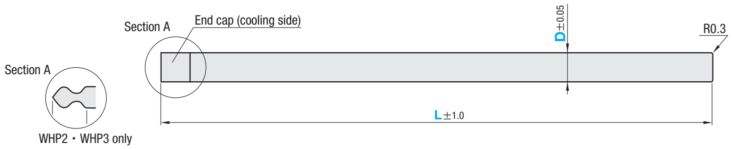
④Bending or squashing the heat transaction pipe hampers its cooling function.

⑤Do not use oil for cooling.

HEAT TRANSACTION PIPES

RoHS

WHP (Heat transaction pipe)


Section A
End cap (cooling side)
D±0.05
R0.3
Section A
L±1.0
WHP2・WHP3 only

M Copper
Usable Temperature Range
30～200℃

Part Number		L	U/Price
Type	D		1～9
WHP	2	35 40 45 50 55 60 65 75 85 105 125 145	Quotation
	3	40 45 50 55 60 65 75 85 105 125 145	
	4	50 55 60 65 75 85 105 125 145 165 205 225	
	6	35 40 45 50 55 60 65 75 85 105 125 145 165 205 225	
	8	35 40 45 50 55 60 65 75 85 105	

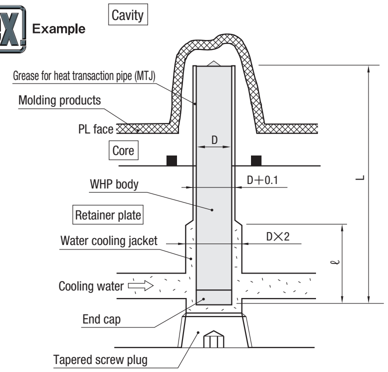
Order

Part Number	—	L
WHP 3	—	105

Price Quotation

Days to Ship Quotation

Example


Cavity
Grease for heat transaction pipe (MTJ)
Molding products
PL face
Core
D
D+0.1
L
WHP body
Retainer plate
Water cooling jacket
D×2
ℓ
Cooling water
End cap
Tapered screw plug

■Mounting Method

①Make a mounting hole in D+0.1 diameter.

②Provide a water cooling jacket in light of the following:

Depth (ℓ) → L/3 or more

Hole diameter → D×2 or more

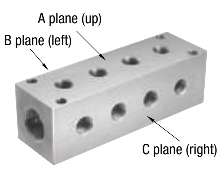
③We recommend that the MTJ grease be applied on the heat transaction pipe before inserting WHP into a mold.

④The heat transaction pipe(WHP) must be inserted so that its end cap is on the cooling side.

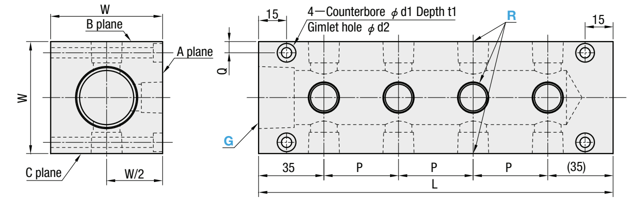
MOLD MANIFOLDS

Non JIS material definition is listed on P.1351 - 1352

—Branch type— RoHS


A plane (up)
B plane (left)
C plane (right)

KMB (branch type)

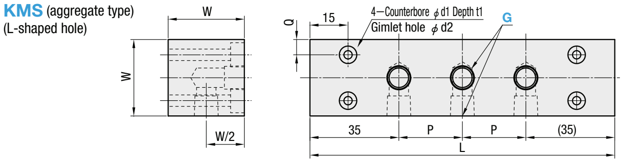

W
B plane
A plane
Q
W
C plane
W/2
15
4—Counterbore ϕd1 Depth t1
Gimlet hole ϕd2
R
15
G
35
P
P
P
(35)
L

※ The above is the diagram of "KMB—ABC4—G8—R3."

M A5302 (Aluminum)
H Socket head cap screws (4 pieces)

—Aggregate type—
(L-shaped hole) RoHS

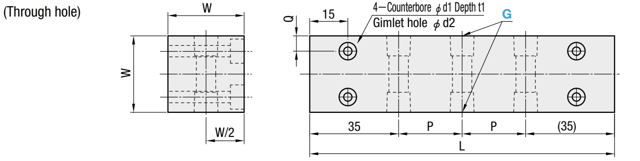
KMS (aggregate type)
(L-shaped hole)


W
W
W/2
Q
15
4—Counterbore ϕd1 Depth t1
Gimlet hole ϕd2
G
35
P
P
(35)
L

※ The above is the diagram of "KMS—L3—G3."

(Through hole)

(Through hole)


W
W
W/2
Q
15
4—Counterbore ϕd1 Depth t1
Gimlet hole ϕd2
G
35
P
P
(35)
L

※ The above is the diagram of "KMS—K3—G3."

M A5052(Aluminum)
H Socket head cap screws (4 pieces)

A 4	d1	d2	t1	Q	W	Part Number			Rc(PT) selection	
						Type	Hole processing surface (H)	Number of holes on one plane (N)	G	R
CB 5— 40	9.5	5.5	5.4	6	30	**KMB—** (Branch type)	(Branch type) One plane : A, B, and C Two planes : AB, BC, and AC Three planes : ABC	1～4	1(1/8)	1(1/8)
CB 5— 45					35				2(1/4)	2(1/4)
CB 5— 50					40				3(3/8)	3(3/8)
CB 8— 65	14	9	8.6	8	50				4(1/2)	4(1/2)
CB 8— 75					60				6(3/4)	6(3/4)
CB 8— 80					65	**KMS—** (Aggregate type)	(Aggregate type) L-shaped hole : L Through hole : K		8(1)	No need to designate R for KMS
CB10— 90	17	11	10.8	9	75				10(1・1/4)	
CB10—100					85				12(1・1/2)	

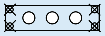
For KMB, G≧R. For KMS, G≦6.

Order

Part Number — G — R
KMB—ABC4 — G8 — R3
KMS—L3 — G3

Alterations

Part Number — G — R — (NA)
KMB—ABC4 — G8 — R3 — NA
KMS—L3 — G3 — NA

Alteration	Code	Spec.	1Code
	NA	Bolt hole is not processed. No socket head cap screw is supplied.	Quotation

Pitch (P) and full length (L)

Branch (R) Aggregate (G)	Pitch (P)	Full length L=(N−1)×P+70			
		N=1	N=2	N=3	N=4
1	25	70	95	120	145
2	35	70	105	140	175
3	40	70	110	150	190
4	45	70	115	160	205
6	50	70	120	170	220

Days to Ship **Quotation**

Price **Quotation**

COOLING CIRCUIT PLUGS

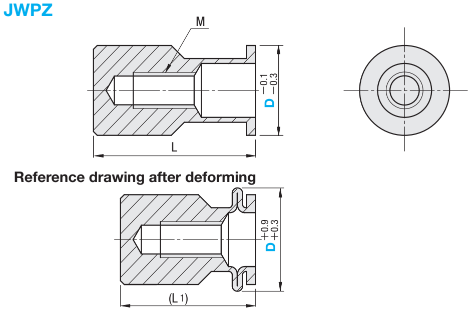
—COMBINED TYPE—

TOOLS FOR COOLING CIRCUIT PLUG

Non JIS material definition is listed on P.1351 - 1352

RoHS

JWPZ


M
L
D $^{-0.1}_{-0.3}$
Reference drawing after deforming
(L1)
D $^{+0.9}_{+0.3}$

M Aluminum alloy

L	(L_1)	M	Part Number Type	D	U/Price 1～15	Slide Unit Price 16～30	31～49
13	12.6	3	JWPZ	6	Quotation		
16	14.2	4		8			
17	14.8			10			
22	19.8	6		12			

※(L_1) represents the diameter of water flow hole D—0.1 after deforming.

Order Part Number JWPZ6

Days to Ship Quotation

Price Quotation

■Characteristics

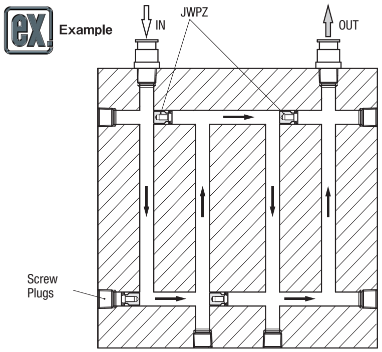
By setting this component inside the cooling hole, this component can block the cooling water circulation pathway.

All-in-one type enables easier installation to the cooling hole. Can be fixed inside the cooling hole to enlarge and crush the outer diameter with the tool for Cooling Circuit Plug JWPKS.

Mold installation is not available with JWPZ only. Need tool for Cooling Circuit Plug such as JWPKS (**Right page**) .

JWPZ is made of aluminum alloy. Note that if alkali detergent is used, it will deteriorate.

Example


IN
JWPZ
OUT
Screw Plugs

Do not use JWPZ only at the end part of the cooling hole. Be sure to use with screw plug.

■Specifications

Type	JWPZ			
D	6	8	10	12
Diameter of water pathway	D $^{+0.2}_{-0.1}$			
Working pressure (kPa) {kgf/cm²}	588{6}			
Usable fluid	Water			
Possible temperature of use	130℃ or less			

Package Products

Guide of package sales

With this bulk sales service, you can save.

Part Number PACK	Type	D	Package Price 50 PACK	100 PACK
50 PACK 100 PACK	JWPZ	6	Quotation	
		8		
		10		
		12		

Order

Part Number PACK	Type	D
(50 pieces) 50 PACK	—JWPZ	6
(100 pieces) 100 PACK	—JWPZ	6

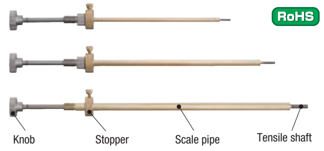
Days to Ship Quotation

RoHS

JWPKS

Tool set

①～⑩


③D6 Tool
④D8 and 10 Tool
⑤D12 Tool
Knob
Stopper
Scale pipe
Tensile shaft

RoHS

②Special wrench

RoHS

	Items	Quantity	M
①	Special packaging case (JWPKC)	1	PP, PE, Polyurethane
②	Special wrench (JWPKW)	1	Aluminum die casting, SCM
③	D6 Tool (JWPK3)	1	Brass, S45C, SUM23
④	D8 and 10 Tool (JWPK4)	1	
⑤	D12 Tool (JWPK6)	1	
⑥	JWPZ6	25	Aluminum alloy
⑦	JWPZ8	25	
⑧	JWPZ10	25	
⑨	JWPZ12	25	
⑩	Instruction manual	1	—

Order Part Number JWPK3

Days to Ship Quotation

Part Number		U/Price ～2
①～⑩	JWPKS	Quotation
②・⑩	JWPKW	
③	JWPK3	
④	JWPK4	
⑤	JWPK6	

■Characteristics

- Matching to four types of the diameter of water hole, D=6, 8, 10 and 12mm.
- JWPKS, tool set for Cooling Circuit Plug, is a special tool to fix JWPZ (**Left page**) into the cooling hole.
- Can fix the cooling circuit plug at any position by using scale value on the scale pipe and stopper.

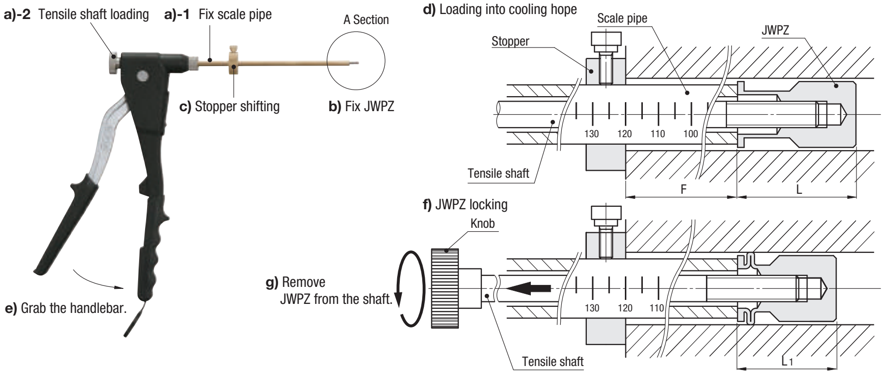
■Depth to load cooling circuit plug

Diameter of water pathway D	Max. depth Fmax. (※1)
6	150
8	200
10	200
12	250

(※1) Max. scale value on the scale pipe

Example

a) Match up the suitable tool (JWPK) and special wrench to meet D dimensions of the cooling circuit plug.
b) Fix JWPZ at Part A. Close tightly to the end part of scale pipe.
c) Move the stopper on the scale pipe to the position F to fix the cooling circuit plug.
d) Load the scale pipe into the mold cooling hole and put stopper on the mold side surface.
e) Be careful for the scale pipe not to lean against mold cooling hole and grab the handlebar by both hands.
f) Tensile shaft slides back and cooling circuit plug profile expands.
g) By verifying the immovable of the cooling circuit plug, remove JWPZ from the shaft by unlocking the tensile shaft knob.


a)-2 Tensile shaft loading
a)-1 Fix scale pipe
A Section
c) Stopper shifting
b) Fix JWPZ
e) Grab the handlebar.
d) Loading into cooling hope
Scale pipe
Stopper
JWPZ
130
120
110
100
Tensile shaft
F
L
f) JWPZ locking
Knob
g) Remove JWPZ from the shaft.
130
120
110
Tensile shaft
L1

■Guide for usage

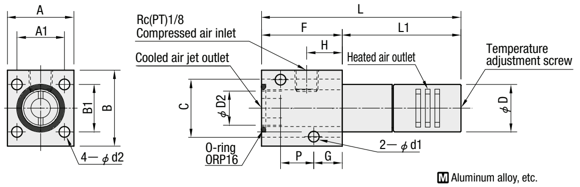
- If you mount the cooling circuit plug, the special tool set and single parts for combination, JWPKW＋JWPK3, 4, or 6 are available.
- At the time of mold maintenance or when the fixing location set at wrong position, remove the cooling circuit plug by drilling hole and replace with new cooling circuit plug.

AIR JET COOLERS FOR MOLD

—COMPACT TYPE—

RoHS

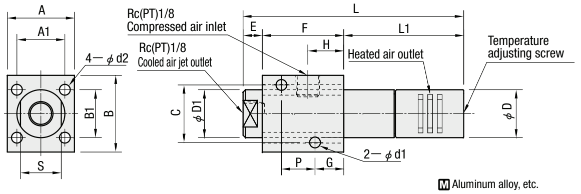
AJCMV


A
A1
B1
B
4—φd2
Rc(PT)1/8
Compressed air inlet
Cooled air jet outlet
C
φD2
O-ring
ORP16
L
F
H
L1
Heated air outlet
Temperature
adjustment screw
φD
2—φd1
P
G

M Aluminum alloy, etc.

RoHS

AJCMH


A
A1
4—φd2
B1
B
S
Rc(PT)1/8
Compressed air inlet
Rc(PT)1/8
Cooled air jet outlet
C
φD1
L
E
F
H
L1
Heated air outlet
Temperature
adjusting screw
φD
2—φd1
P
G

M Aluminum alloy, etc.

Common													Rc(PT)	AJCMV		AJCMH				Part Number		U/Price
L1	F	H	G	P	C	d1	d2	D	A	A1	B	B1		D2	L	E	D1	S	L	Type	No.	1～4
50	34	15	12	14	24	4.5	4.5	20	28	20	32	20	1/8	14.4	84	—	—	—	—	AJCMV	150	Quotation
														—	—	8	20	17	92	AJCMH	150	
106	52	23	18	24	36	6.6	5.5	32	40	30	46	30	3/8	—	—	12	30	26	170		600	

Order

Part Number
AJCMV150

Price **Quotation**

Days to Ship **Quotation**

■Characteristics

- The cooler produces cool air such that the maximum temperature difference is —55℃ compared to the entered temperature by providing compressed air.
- The cooler efficiently cools narrow holes that cannot be cooled by cool water and leaky parts and improves cycle time.
- Effective at locally cooling molded parts.

■Usage

- Use the cooler with 0.3～0.7MPa of pressure.
- Use an air dryer to provide dehumidified air and set an air filter (filtration 40 μm and lower) and an oil mist separator to prevent foreign objects from getting in.
- Be careful not to burn yourself with hot air from the heat release outlet.
- Release air that cooled a mold from the cool air jet outlet into the air. If you do not release it, cool air will stop.
- If the air is noisy, apply any silencer.

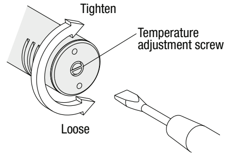
■Breakdowns and repairs

- If cooling gets less effective, follow the procedure below for check.

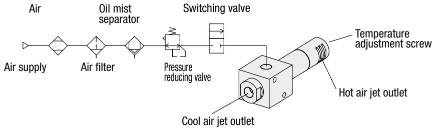
①Readjust the temperature adjusting screw.
②Check if a clogged filter or mist separator causes reduction of pressure.
③Check if enough air consumption on the right page is provided.

- We assume no responsibility for dismantled products.

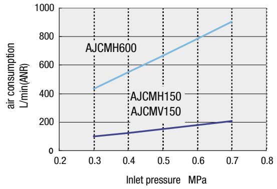
■Cool air temperature adjusting method


Tighten
Temperature
adjustment screw
Loose

Use the temperature adjusting screw on the body tip to adjust cool air temperature. If you loose the temperature adjusting screw, cool air temperature drops and the amount of cool air decreases. Conversely, if you tighten the temperature adjusting screw, cool air temperature rises and the amount of cool air increases.

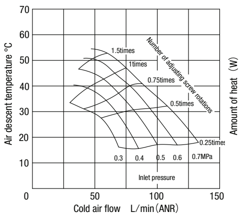

Air
Oil mist
separator
Switching valve
Air supply
Air filter
Pressure
reducing valve
Temperature
adjustment screw
Hot air jet outlet
Cool air jet outlet

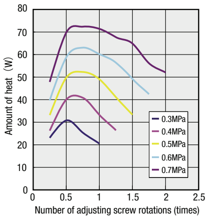
■air consumption

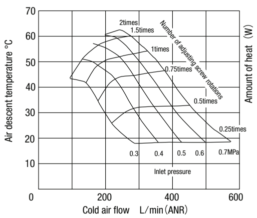


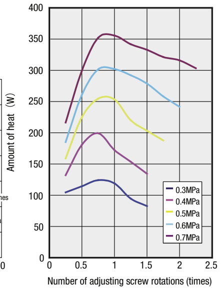
■Temperature・Heat amount characteristic

- The air descent temperature is the descent temperature against the air temperature at the entrance.
- When the adjusting screw is completely tightened, the value for the number of adjusting screw rotations is 0.
- The following graph shows a characteristic of the air jet cooler only.
- Amount of heat (W) is power that cool air from the cool air jet orifice can draw from cooling objects. 1W＝0.86kcal/h





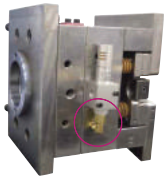




■Example of how to mount

- Screw a cooler on the side of a mold for direct flow of cool air. (Photo1)
  ※With AJCMV mounted
- Set a cooler near the side of a mold and use pipes and the like for flow of cool air. (Photo2)
  ※With AJCMH mounted

(Photo1)



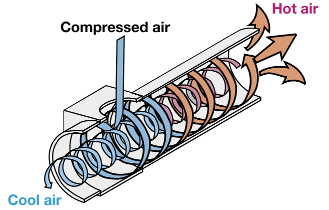
(Photo2)

To prevent condensation, wrap the piping sections etc. in a commercially available insulating tube.

■Explanation

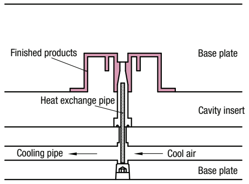
Principle of cool air separation

As the following diagram shows, compressed air sent to this device is forcibly rotated at high speed in the device to separate cool air from hot air , which applies the principle of vortex theory. For this phenomenon, only cool air can be taken out.

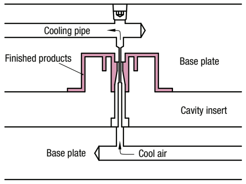

Hot air
Compressed air
Cool air

Example

Heat exchange with a cooling pipe

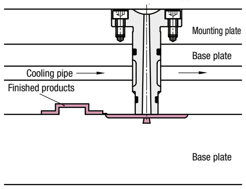

Finished products
Base plate
Heat exchange pipe
Cavity insert
Cooling pipe
Cool air
Base plate

Cooling heated parts


Cooling pipe
Finished products
Base plate
Cavity insert
Base plate
Cool air

Cooling sprue

Sprue type : SBCK, etc.


Mounting plate
Base plate
Cooling pipe
Finished products
Base plate

■Air jet cooler peripheral parts

■Joints for low temperature

Straight (P1092)
M—NSC
M—NKC

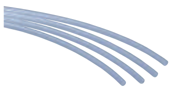
L-shaped (P1092)
M—NSL
M—NKL

Screw adapter joints (P1097)
JEMM
JEMMR

L-shaped joints (P1099)
JEFL
JEFLR

■Tubes for low temperature

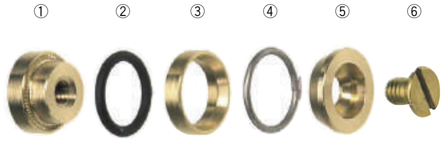
M—SFT (P1107)



M Fluorine resin
Possible temperature of use —65～180℃

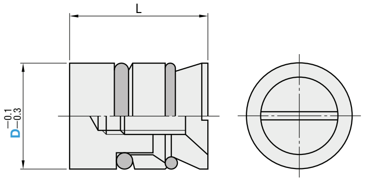
COOLING CIRCUIT PLUGS

Due to changes in manufacturer specifications, O-rings may very occasionally be green, etc. The quality is same.



Item	① Body	② O-rings	③ Spacer	④ Metal ring	⑤ Tapered washer	⑥ Screw
M	Brass (C3604)	Fluoric rubber	Brass (C3604)	—	Brass (C3604)	Brass (C3604)

JWP



L	Part Number		U/Price
	Type	D	1～9
10	JWP	6	Quotation
		8	
		8.5	
		10	
		11.5	
		12	
12		14	

■Features

Enables free layout of cooling water circulation routes.
Can be fixed on any place inside a cooling hole.

■Specifications

Size	D6	D8	D8.5	D10	D11.5	D12	D14
O-ring's outer diameter (reference)	6	8.2	8.7	10.2	11.7	12.2	14.2
O-ring's outer diameter tolerance (reference)	±0.25						
Cooling water hole diameter	6	8	8.5	10	11.5	12	14
Water hole diameter tolerance	$^{+0.15}_{0}$						
Working pressure (kPa) {kgf/cm²}	588 {6}						
Fluid	Water only						
Usable temperature range	80℃ or lower (recommended)						

※Although the usable temperature range for a fluoric rubber O-ring is －15℃～150℃, we recommend that the JWP Cooling Circuit Plug be used in a temperature below 80℃ since its O-ring is deformed upon installation.

Order Part Number
JWP 6

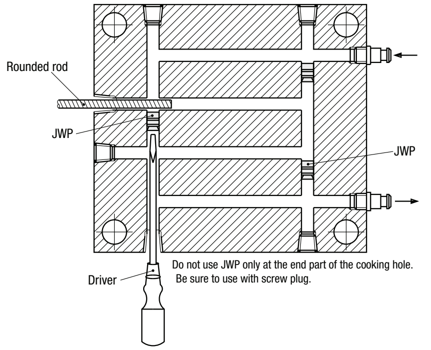
Days to Ship Quotation

Price Quotation

■How to Mount

As shown in the figure, insert a rod, etc. to stop the plug at the desired place, and fix it using a screw driver.
Fastening the screw makes the O-ring expand and deform, fixing the plug firmly inside the cooling hole.

Example The cooling circuit can be freely designed as shown below.



Do not use JWP only at the end part of the cooking hole.
Be sure to use with screw plug.

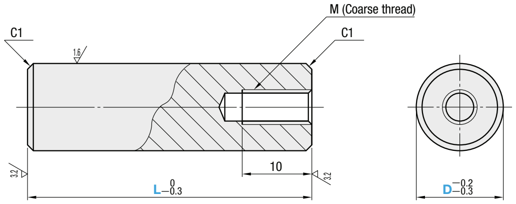
COOLING CIRCUIT PLUGS

— METAL BAR TYPE —

Non JIS material definition is listed on P.1351 - 1352

RoHS

JWPMT



M S45C

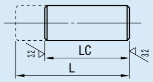
M×Pitch (Coarse thread) (JWPMT only)	Part Number		L 10mm increments
	Type	D	
M6×1.0	JWPMT	11	30～200
		15	
M10×1.5		18	
		22	
		24	

Order Part Number — L
JWPMT 11 — 150

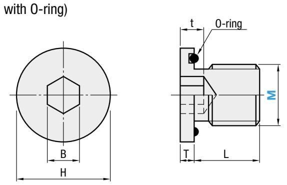
Days to Ship Quotation

Price Quotation

Alterations Part Number — L(LC)
JWPMT 11 — LC142

Alteration	Code	Spec.	1Code
	LC	Shortens the full length. LC=1mm increments L min.<LC<L max.	Quotation

MSWM (Screw plug with O-ring)



M S45C
H 32 42HRC
Thread JIS B0207
S Black Oxide (Fe_3O_4)

H	B	t	T	L	O-ring JIS No.	Recommended Tightening Torque N・m{kgf・m}	M×Pitch	Part Number Type	Part Number M	U/Price 1~9
16	5	3.5	4	7	P10	15.7 { 1.6}	8×1.0	MSWM	8	Quotation
19.5		4		8	P12.5	19.6 { 2.0}	10×1.0		10	
21	6	5		12	P14	27.5 { 2.8}	12×1.5		12	
23					P16	39.2 { 4.0}	14×1.5		14	
25	8	6			P18	63.7 { 6.5}	16×1.5		16	
27					P20	78.4 { 8.0}	18×1.5		18	
32.5	10	6.5	5	14	P22.4	112.7 {11.5}	20×1.5		20	
35					P25	137.2 {14.0}	22×1.5		22	
38	12	7.5			P28	201.0 {20.5}	24×1.5		24	
40				16	P30	245.0 {25.0}	27×2.0		27	

The O-ring conforms with JIS Class 1 B2401 (butadiene acrylonitrile rubber). Its usable temperature range is −30℃~80℃

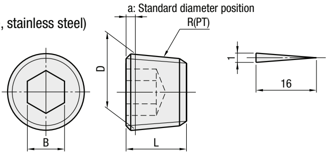
Order Part Number
MSWM 10

Days to Ship Quotation

Price Quotation

RoHS

MSWT (Tapered type)
MSWTS (Tapered type, stainless steel)



Thread JIS B 0203 tapered thread for tubing R(PT)
*The thread on MSWT No. S is ANSI B2.2
tapered thread for American tubing (NPT).

MSWT M SCM435
H 32 42HRC
S Black Oxide (Fe_3O_4)

MSWTS M SUSXM7

D	a	L	B	t	R(PT)	Part Number Type	Part Number No.	MSWT U/Price 1~99	MSWT U/Price 100~199	MSWTS U/Price 1~99	MSWTS U/Price 100~199
7.723	0.45	6	4	3.0	1/16	MSWT	*J				
7.779	0.47	6.4	$4^{+0.03}_{-0.032}$	3.1			*S				
9.728	0.45	7	5	3.5	1/8	MSWT MSWTS (Stainless steel)	1			Quotation	
13.157	0.7	8.9	6	4.5	1/4		2				
16.662	0.7	10	8	5	3/8		3				
20.955	0.9	12	10	6	1/2		4				
26.441		14	14	7	3/4		6				
33.249	1.1	16.5	17	9	1		8				

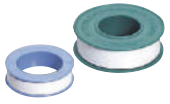
No. of threads per 25.4mm. *The thread on MSWT No. S is ANSI Standard, Use a 5/32" hex wrench for mounting. MSWT No. J is JIS Standard.

To be quoted on price & lead time above Max. Q'ty.

Order Part Number
MSWT J
MSWT 4

Days to Ship Quotation

JST8—5 (Sealing Tape)
JST13—15



RoHS

M Fluorocarbon resin (PTFE)

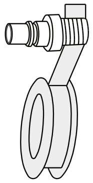
Heat resistance temperature	W (width)	L (length) (meter)	t (thickness)	Part Number	U/Price 1~9
260℃	8mm	5m	0.1mm	JST 8—5	Quotation
	13mm	15m		JST13—15	

Order Part Number
JST8 — 5

Days to Ship Quotation

Price Quotation

Example

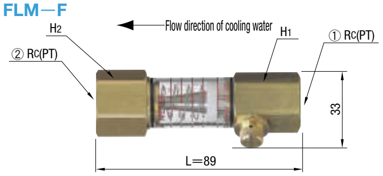


■JST8—5 is narrow and prevents from cutting protrusion when winding around screw plugs and such.

Non JIS material definition is listed on P.1351 - 1352

■ Flow Checkers for Cooling Water

FLM—F



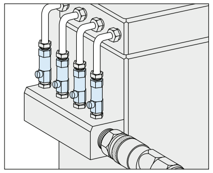
M Scale pipe PC (Polycarbonate resin) Usage temperature range 10℃~60℃

Allen side ⬡H1	Allen side ⬡H2	① Rc(PT)	② Rc(PT)	L	Part Number Type	Part Number No.	U/Price 1~9	Slide Unit Price 10~199	Slide Unit Price 200~399	Slide Unit Price 400~600
⬡23	⬡26	3/8	3/8	89	FLM—F	3		Quotation		

Order Part Number
FLM-F3

Days to Ship Quotation

Example



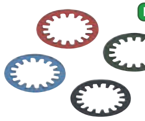
Maximum usage pressure kPa{kgf/cm²}	500 { 5.0}
Withstanding pressure kPa{kgf/cm²}	800 { 8.0}
Recommended maximum tightening torque N・cm{kgf/cm²}	1195 {122}
Max. flow rate	18ℓ/min.

●Characteristics of simplified flow checker for cooling water

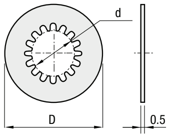
- The flow rate of cooling water can be confirmed with the scale, and it becomes a standard at the cooling condition setting by the workers.
- Flow control valve is built-in, which allows free molding conditioning for each machine.
- Easy maintenance due to simple structure.
- Screw tightening becomes easier in mold installation due to rotary.

■ Marker Rings

RoHS



JMR

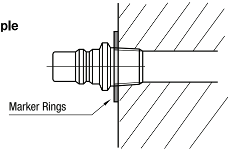


M Aluminum
(A5052P)

d	D	Part Number Type	Part Number No.	Color	U/Price 1~9 sets (A set of 10 sheets)
10	20	JMR	1	B (Blue) G (Green) R (Red) K (Black)	Quotation
12			2		
17	25		3		

Price Quotation

Example



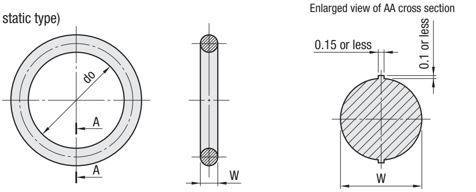
■ Use the marker ring to identify the type and flow direction of fluid.

Order Part Number — Color
JMR 1 — R

Days to Ship Quotation

O-RINGS

ORS (Space saving, static type)
ORP (Movable type)
ORG (Static type)



Part Number	Usable temperature range	M
ORS	−30℃～ 80℃	Nitrile rubber (NBR-70-1)
ORP・ORG	−15℃～150℃	Fluoric rubber (FKM-70)

Usable temperature range is for reference only.

Order — Part Number: **ORS 30**

Price — **Quotation**

Days to Ship — **Quotation**

O-ring groove machining dimension (Reference value)						W	do (inner diameter)		Part Number		U/Price
*d		*D		*D1		(thickness)			Type	No.	1～299
3	0 −0.05	5	+0.05 0	5.3	+0.05 0	1.5±0.1	2.5	±0.15	**ORS** (Space saving, static type)	3	Quotation
4		6		6.3			3.5			4	
5		7		7.3			4.5			5	
6		8		8.3			5.5			6	
7		9		9.3			6.5			7	
8		10		10.3			7.5			8	
9		11		11.3			8.5			9	
10		12		12.3			9.5			10	
12		14		14.3			11.5			12	
14		16		16.3			13.5			14	
15		17		17.3			14.5			15	
16		18		18.3			15.5			16	
18		20		20.3			17.5			18	
20		22		22.3			19.5			20	
22		24		24.3			21.5			22	
24		27		27.5		2.0±0.1	23.5			24	
25		28		28.5			24.5			25	
26		29		29.5			25.5			26	
28		31		31.5			27.5			28	
30		33		33.5			29.5			30	
32		35		35.5			31.5			32	
34		37		37.5			33.5			34	
35		38		38.5			34.5			35	
36		39		39.5			35.5			36	
38		41		41.5			37.5			38	
39		42		42.5			38.5			39	
40		43		43.5			39.5			40	
42		45		45.5			41.5	±0.25		42	
44		47		47.5			43.5			44	
46		49		49.5			45.5			46	
48		51		51			47.5			48	

*For d, D, D1 dimensions, Right page

ORS is space-saving standard instead of JIS standard.

O-ring groove machining dimension (Reference value)				W	do (inner diameter)		O-rings	Part Number		U/Price
*d		*D, D1 (Common)		(thickness)			JIS No.	Type	No.	1～299
3	0 −0.05	6	+0.05 0	1.9±0.07	2.8	±0.24	P 3	**ORP** (Movable type)	3	Quotation
4		7			3.8		P 4		4	
5		8			4.8		P 5		5	
6		9			5.8		P 6		6	
7		10			6.8		P 7		7	
8		11			7.8		P 8		8	
9		12			8.8		P 9		9	
10		13			9.8		P10		10	
11	0 −0.06	15	+0.06 0	2.4±0.07	10.8		P11		11	
12		16			11.8		P12		12	
14		18			13.8		P14		14	
15		19			14.8		P15		15	
16		20			15.8		P16		16	
18		22			17.8		P18		18	

*For d, D, D1 dimensions, Right page

ORP is the equivalent of P series of JIS standard.

O-ring groove machining dimension (Reference value)				W (thickness)	do (inner diameter)		O-rings	Part Number		U/Price
*d		*D, D1 (Common)					JIS No.	Type	No.	1～299
20	0 −0.06	24	+0.06 0	2.4±0.07	19.8	±0.3	P 20	**ORP** (Movable type)	20	Quotation
21		25			20.8		P 21		21	
22		26			21.8		P 22		22	
24	0 −0.08	30	+0.08 0	3.5±0.1	23.7		P 24		24	
25		31			24.7		P 25		25	
26		32			25.7		P 26		26	
28		34			27.7		P 28		28	
30		36			29.7		P 30		30	
31		37			30.7		P 31		31	
32		38			31.7		P 32		32	
34		40			33.7		P 34		34	
35		41			34.7		P 35		35	
36		42			35.7		P 36		36	
38		44			37.7		P 38		38	
39		45			38.7		P 39		39	
40		46			39.7		P 40		40	
42		48			41.7	±0.5	P 42		42	
44		50			43.7		P 44		44	
46		52			45.7		P 46		46	
48		54			47.7		P 48		48	
25	0 −0.10	30	+0.10 0	3.1±0.1	24.4	±0.3	G 25	**ORG** (Static type)	25	
30		35			29.4		G 30		30	
35		40			34.4		G 35		35	
40		45			39.4		G 40		40	
45		50			44.4	±0.5	G 45		45	
50		55			49.4		G 50		50	
55		60			54.4		G 55		55	
60		65			59.4		G 60		60	
65		70			64.4		G 65		65	
70		75			69.4		G 70		70	
75		80			74.4	±0.8	G 75		75	
80		85			79.4		G 80		80	
85		90			84.4		G 85		85	
90		95			89.4		G 90		90	
95		100			94.4		G 95		95	
100		105			99.4		G100		100	
105		110			104.4		G105		105	
110		115			109.4		G110		110	
115		120			114.4		G115		115	
120		125			119.4		G120		120	

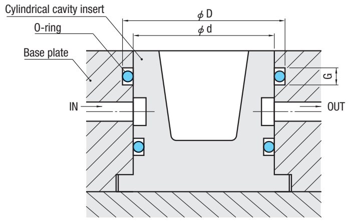
*For d, D, D1 dimensions, refer to the following.

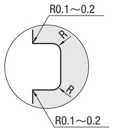
ORP is the equivalent of P series of JIS standard.

ORG is the equivalent of G series of JIS standard.

Example

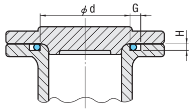
•For Cylinder Face Fixing



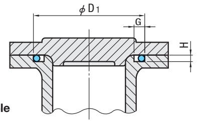


Groove machining example

•For Flat Surface Fixing



Against external pressure



Against internal pressure

■O-ring Groove Dimensions

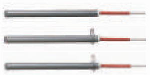
Part Number	$G^{+0.25}_{0}$	H	T H	Rmax.	D・d Eccentricity max.
ORS 3～ 22	2.5	1.0	0 −0.1	—	—
ORS 24～ 48	2.7	1.5		—	—
ORP 3～ 10	2.5	1.4	±0.05	0.4	0.05
ORP 11～ 22	3.2	1.8		0.4	0.05
ORP 24～ 48	4.7	2.7		0.7	0.08
ORG 25～120	4.1	2.4		0.8	0.08

- H size is required for flat surface fixing.
- Use the ORP O-rings for movable applications.
- Calculate the groove depth for cylinder face fixing from $\frac{\phi D(D_1)-\phi d}{2}$.
- Notation of O-rings for movable applications and for flat surface fixing is according to the specifications of JIS B2401.
- There is difference between sizes of O-rings for movable applications and for flat surface fixing.
- O-rings for movable applications can be used for flat surface fixing as well.

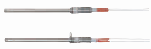
HEATING ITEMS

HEATING ITEMS

Product Name Part Number	Cartridge Heaters—Output selection type— MCH	—Output designation type— MCHV	Bolts for Cartridge Heater MCHB
Page	1145	1146	1146

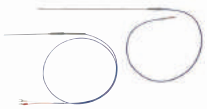


Cartridge Heaters—With stopper flange— MFCH	—L dimension · Wattage · Flange selection— MSCHN · MSCHA · MSCHB	—With stopper flange · Lead protection cover— MCHJ	—Lead protection cover/L dimension · Wattage · Flange selection— MJCHN · MJCHA · MJCHB
1147	1148 1148 1148	1149	1150 1150 1150



Cartridge Heaters, with lead wire bottom reinforced type MNCHN · MNCHA · MNCHB	Cartridge Heaters—With Knurl Cap— MRCHN · MRCHA · MRCHB	Cartridge Heaters Soaking type—L dimension · Wattage · Flange selection— MKCHN · MKCHA · MKCHB	Soaking type—Lead protection covers/L dimension · Wattage · Flange selection— MKJCHN · MKJCHA · MKJCHB
1151 1151 1151	1152 1152 1152	1153 1153 1153	1154 1154 1154

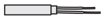
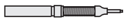
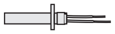
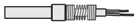
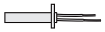
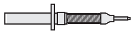
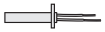
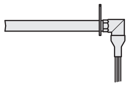
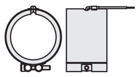
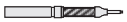
Cartridge Heaters, heating tip part type MTCHN · MTCHA · MTCHB	—L form type— MLCHN · MLCHA · MLCHB · MLCHC	CARTRIDGE HEATERS MTSJCHN · MTSJCHA · MTSJCHB	Band Heaters MBH	Band Sensors SSMB
1155 1155 1155	1156 1156 1156 1156	1157 1157 1157	1159	1159



Lead Wires For Heater 10PACK—GHRS	Temperature Sensor Sheathed Thermocouples SSM SSMJ TMK	Coupling nipples CSF	Sheathed Thermocouples—Screw Type— SSMT SSMTJ
1160	1161 1161 1161	1161	1162 1162

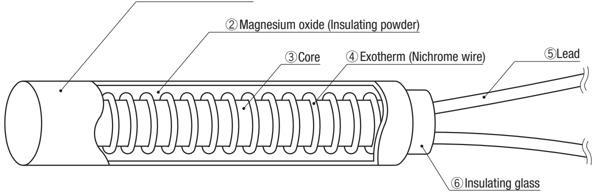
Sheathed Thermocouples—Spring Attachment Type— SSMH SSMHJ	Simplified Thermometers With Magnet M—HM	Simplified Thermometers TGU	Radiation thermometer TGR
1163 1163	1164	1164	1164

GUIDE FOR HEATING ITEMS

Flange				Without Flange				With Flange			
L dimension (Full length) · W (Wattage) · V (Voltage) designation				L · W · V selection type		L · W · V designation type		L · W · V selection type		L · W · V designation type	
Standard Type				MCH MCHV	P.1145 P.1146	MSCHN	P.1148	MFCH	P.1147	MSCHA MSCHB	P.1148
Variation of heater bottom		Protection cover type		—	—	MJCHN	P.1150	MCHJ	P.1149	MJCHA MJCHB	P.1150
		Bottom reinforced type		—	—	MNCHN	P.1151	—	—	MNCHA MNCHB	P.1151
		With knurl cap		—	—	MRCHN	P.1152	—	—	MRCHA MRCHB	P.1152
Variation of heating	Soaking	Straight type		—	—	MKCHN	P.1153	—	—	MKCHA MKCHB	P.1153
		Protection cover type		—	—	MKJCHN	P.1154	—	—	MKJCHA MKJCHB	P.1154
		Tip heating type		—	—	MTCHN	P.1155	—	—	MTCHA MTCHB	P.1155
Variation of shapes		L-shaped type		—	—	MLCHN	P.1156	—	—	MLCHA MLCHB MLCHC	P.1156
Band type				MBH	P.1159	—	—	—	—	—	—
Sensor attached type				—	—	MTSJCHN	P.1157	—	—	MTSJCHA MTSJCHB	P.1157

GUIDE FOR CARTRIDGE HEATERS

■Basic Structure Drawing



①Stainless sheath
②Magnesium oxide (Insulating powder)
③Core
④Exotherm (Nichrome wire)
⑤Lead
⑥Insulating glass

■Heater selection chart

Shaft diameter・Length・Wattage・Voltage	Function	Shape: Straight	Shape: With flange	Shape: Others
Fixed size	Standard	**Output selection type** MCH・MCHV P.1145～1146	**Output selection type** MFCH P.1147	
	You want to bend and/or protect leads		**With lead protection cover** MCHJ P.1149	
	Applicable for sprue and nozzles			**Band heater** MBH P.1159
Free to select	Standard	**Cartridge heater** L dimension・Voltage・Wattage selection MSCH□ P.1148		
	You want to bend and/or protect leads	**With lead protection cover** L dimension・Voltage・Wattage selection MJCH□ P.1150		
	Break-resistant lead wire bottom	**Bottom reinforced type** L dimension・Voltage・Wattage selection MNCH□ P.1151		
	With a cap to hold for frequent removal	**Knurl cap type** L dimension・Voltage・Wattage selection MRCH□ P.1152		
	Sensor attached type for limited space	**Sensor attached type** L dimension・Voltage・Wattage selection MTSJCH□ P.1157		
	L-shaped for limited space			**L type** L dimension・Voltage・Wattage selection MLCH□ P.1158
Selectable heat generator details	Standard	**Soaking type** L dimension・Voltage・Wattage selection MKCH□ P.1153		
	You want to bend and/or protect leads	**Soaking type With lead protection cover** L dimension・Voltage・Wattage selection MKJCH□ P.1154		
	Heatable tip	**Tip part heating type** L dimension・Voltage・Wattage selection MTCH□ P.1155		

■How to mount cartridge heater

①Process for mounting hole

- Specify the recommended hole diameter tolerance on the plate such that D dimension is H7 or within D+0.1.
  If clearance between the mounting hole and the heater is bigger, the heater may have abnormal heating and it may cause a break and ignition.
- We recommend applying reaming to the mounting hole.
- We recommend using lubricating oil for cartridge heater in order to help more uniform radiation.

②Extended part of the heater

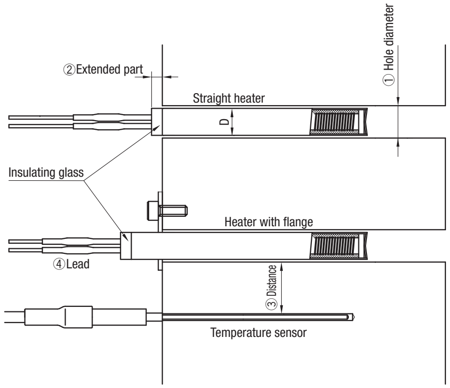
Keep the heater in the plate to avoid abnormal heating. (The heater can stick out from the insulating glass and the flange.)

③Distance between the heater and the temperature sensor

10mm or longer is appropriate for the distance between the heater and the temperature sensor (thermocouple). If they are too close, it may cause malfunction of the temperature sensor(except for the sensor attached type).

④Lead handling

Note that lead wires may break if you repeat bending them.



■Notes on handling

1) Water adhesion

If water (humidity) enters inside the heater, it may break insulation and cause shorts of the heater and breakage of the controller for the heater. If the heater shorts out, it may cause a break in the heater and heating and ignition of lead wires.

2) Oil adhesion

If the heater is inserted into mold with oil or used under a situation where the heater gets oil on it, oil carbonises and it may cause abnormal heating and shorts of the heater. Please be sure to remove oil completely before use.

3) Heating of the heater in air

If you remove the heater from the mold and heat it in air, it may cause abnormal heating and shorts of the heater because the heater can dissipate less heat in air. Even if the heater is mounted to the mold, but the heat generator or the stainless sheath (bottom or tip) is exposed to the air, it may cause abnormal heating and shorts of the part.

4) Prohibition of the use with more than the rated voltage (V)

If you use the heater with more than the rated voltage, it may cause abnormal heating and a break and shorts of the heater. It may also cause shorts inside the controller for the heater.

5) Control method of the controller for the heater

In order to gain stability in mold products and longer lifetime of the heater, use a PID heater controller.

■How to select a heater

①Calculate necessary wattage (W) for a heater to raise mold temperature up to a preset temperature.

It is calculated according to below calculation formula.

$$\text{Necessary wattage for heater (kW)} = \frac{\text{Weight of heated object (kg)} \times \text{Specific heat of heated object (kcal/kg・℃)} \times \text{Temperature increase (℃)}}{860 \times \text{Heating time (h)} \times \text{Efficiency } (\eta)}$$

Though it is difficult to calculate accurately efficiency (η) because it varies on conditions of heat-retention, heat insulation, arrangement of the heater, etc., generally 0.2～0.5 is suitable.

Material	Specific gravity (g/cm^3)	Specific heat (kcal/kg・℃)
Steel	7.85	0.113
Stainless Steel	7.82	0.110
A7075P (Aluminum)	2.80	0.230
Brass	8.70	0.100

Example) Necessary wattage when controlling stainless mold of 130kg with heater and raising mold temperature up to 110℃ in 30 minutes (Temperature=21℃, efficiency η =0.5)

$$\text{Necessary wattage for heater (kW)} = \frac{130 \times 0.11 \times (110-21)}{860 \times 0.5 \times 0.5} = 6(\text{kW}) = 6{,}000(\text{W})$$

②Calculate number of heaters and wattage (W) for one heater.

Decide the number of the heaters depending on the size of object to heat, and get total wattage required to rise the temperature of it.

Example) Use six heaters of approximately 1000 (W) (Total 6000W)

※Heat loss is not taken into account. Please consider approximately 20～30% increase for the calculated value in wattage.

■How to select a cartridge heater type

・For fixed size

①Select a heater diameter and its length. → ②Select usable voltage. → ③Select necessary wattage.

MFCH12−180 ⇨ MFCH12−180−V200 ⇨ MFCH12−180−V200−W700

・For variable size

①Select a flange shape. → ②Set a heater diameter and its length. → ③Select voltage. → ④Select necessary wattage.※

MSCHA ⇨ MSCHA12−300 ⇨ MSCHA12−300−V200 ⇨ MSCHA12−300−V200−W1400

※For a variable-size heater, specify the wattage such that the watt density is 2≦W/cm^2≦15 when setting wattage.
The heaters whose watt density (W/cm^2) is low last long and steady in controlling.

$$\text{Watt density (W/cm}^2) = \frac{\text{Wattage (W)}}{\text{Heat generator length} \times \text{Heater diameter} \times 3.14}$$

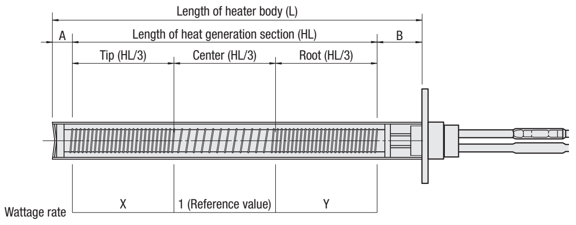
GUIDE FOR CARTRIDGE HEATER SOAKING TYPE

■Characteristics

The heater wattage of a cartridge heater soaking type is divided and set into three zones according to the shape and size of the object being heated, and also the amount of heat dissipated, resulting in a more uniform heat distribution than that of a general cartridge heater.

This type is suitable for when the temperature of a general cartridge fails to stabilize, and the molded product is warped, its dimensions vary randomly, problems related to luster occur, or when more accurate die temperature distribution control is demanded such as when molding liquid silicone rubber (LSR) or thermosetting resin.

■Basic Structure Drawing

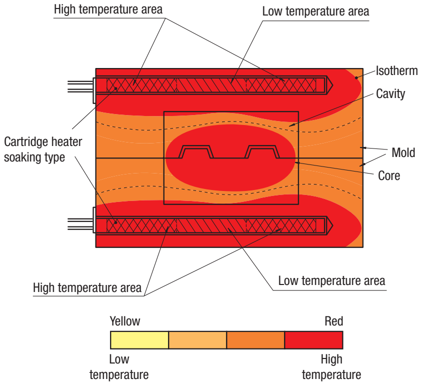

Length of heater body (L)
A
Length of heat generation section (HL)
B
Tip (HL/3)
Center (HL/3)
Root (HL/3)
Wattage rate
X
1 (Reference value)
Y

●Wattage rate

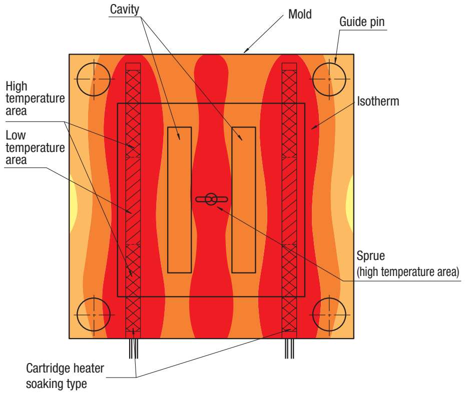
This means the distribution ratio with respect to the total wattage of the entire heater (W). It is possible to specify the wattage rates of the tip and root as multiples with respect to the wattage of the center as the reference value of 1.

X＝Wattage rate of tip
1 (Reference value)＝Wattage rate of center
Y＝Wattage rate of root
A＋B＝Length of non-heat generating section

Isotherm distribution for the case where a cartridge heater soaking type is installed on the mold (outline drawing)


High temperature area
Low temperature area
Isotherm
Cavity
Cartridge heater soaking type
Mold
Core
High temperature area
Low temperature area
Yellow
Red
Low temperature
High temperature

Isotherm distribution for the case where a cartridge heater soaking type is installed on the cavity die (outline drawing)


Cavity
Mold
Guide pin
High temperature area
Isotherm
Low temperature area
Sprue
(high temperature area)
Cartridge heater soaking type

■Installation method and precautions for use

It is possible to install this type in the same way as an ordinary cartridge heater.
For the method of installation and precautions for use, refer to **P.1141**～ "Outline of Cartridge Heater"

■Selection method

① To raise mold temperature up to a preset temperature, calculate a necessary wattage to heater.

It's calculated according to below calculation formula.

$$\text{Necessary wattage for heater (kW)} = \frac{\text{Weight of heated object (kg)} \times \text{Specific heat of heated object (kcal/kg°C)} \times \text{Temperature increase (°C)}}{860 \times \text{Heating time (h)} \times \text{Efficiency } (\eta)}$$

Though it is difficult to calculate accurately efficiency (η) because it varies on conditions of heat-retention heat insulation, arrangement of the heater, and etc., generally 0.2～0.5 is suitable.

Example) Necessary wattage (21˚C) when controlling stainless mold of 130kg
with heater and raising mold temperature up to 110˚C in 30 minutes

$$\text{Necessary wattage for heater (kW)} = \frac{130[\text{kg}] \times 0.11[\text{kcal/kg°C}] \times (110-21)[\text{°C}]}{860 \times 0.5[\text{h}] \times 0.5[\eta]}$$

●Specific gravity/Specific heat of main materials

Material	Specific weight (g/cm^3)	Specific heat (kcal/kg˚C)
Aluminum (7075)	2.80	0.230
Copper	7.85	0.113
Stainless steel	7.82	0.110
Brass	8.70	0.100

② Calculate number of heaters and wattage for one heater.

Decide the number of the heaters depending on the size of heated object, and get total wattage (W) required to rise the temperature of the heated object.

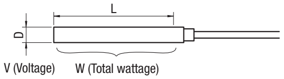
Example) Use six heaters of 1000 (W) (Total 6000W)

＊The above calculation method does not concern heat loss. Please consider approximately 20～30% increase for the calculated value in kW.

■Selection of soaking cartridge heater

① Determine the heater diameter (D), length (L), voltage (V) and the total wattage of the heater (W) in the same way as for a conventional cartridge heater.

(Example) **MKCHA12－300－V220－W1000**
(D) (L) (V) (W)

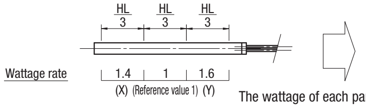

L
D
V (Voltage)
W (Total wattage)

② Determine the wattage rate of the tip (X) and the wattage rate of the root (Y) for the case where the wattage rate of the center is the reference value of 1.

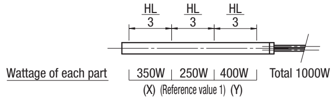
＊Because the center is defined as the reference value of 1, there is no need to specify it.

(Example) **MKCHA12－300－V220－W1000－X1.4－Y1.6**
(D) (L) (V) (W) (X) (Y)

(Following example of wattage rate: When X and Y are specified based on reference values of a one-sided horizontal insertion die.)


HL/3
HL/3
HL/3
Wattage rate
1.4
1
1.6
(X)
(Reference value 1)
(Y)

The wattage of each part is calculated by using the "wattage calculation equation".


HL/3
HL/3
HL/3
Wattage of each part
350W
250W
400W
Total 1000W
(X)
(Reference value 1)
(Y)

●W density (W/cm^2) Limit equation

When the wattage density becomes 15 (W/cm^2) or more, wire breakage is liable to occur, so specify the W density of each part within the range 2～15 (W/cm^2).

●Wattage calculation equation of each part

$$\text{Wattage of tip} = \text{W (Total wattage)} \times \frac{\text{X (Wattage rate of tip)}}{\text{X+Y+1 (Total wattage rate)}}$$

$$\text{Wattage density of tip (W/cm}^2) = \frac{\text{Wattage of tip}}{\frac{HL}{3} \times D \times 3.14 \div 100}$$

$$\text{Wattage of center} = \text{W (Total wattage)} \times \frac{\text{1 (Wattage rate of center)}}{\text{X+Y+1 (Total wattage rate)}}$$

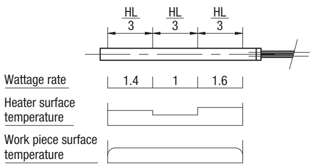
$$\text{Wattage density of center (W/cm}^2) = \frac{\text{Wattage of center}}{\frac{HL}{3} \times D \times 3.14 \div 100}$$

$$\text{Wattage of root} = \text{W (Total wattage)} \times \frac{\text{Y (Wattage rate of root)}}{\text{X+Y+1 (Total wattage rate)}}$$

$$\text{Wattage density of root (W/cm}^2) = \frac{\text{Wattage of root}}{\frac{HL}{3} \times D \times 3.14 \div 100}$$

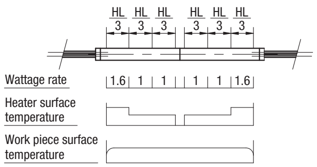
■Example of wattage rate (reference value)

One-sided horizontal insertion die


HL/3
HL/3
HL/3
Wattage rate
1.4
1
1.6
Heater surface temperature
Work piece surface temperature

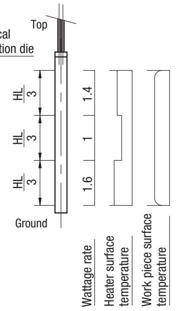
Ordering example) **MKCHA12－200－V200－W300－X1.4－Y1.6**
(D) (L) (V) (W) (X) (Y)

Double side horizontal insertion die


HL/3
HL/3
HL/3
HL/3
HL/3
HL/3
Wattage rate
1.6
1
1
1
1
1.6
Heater surface temperature
Work piece surface temperature

Ordering example) **MKCHA12－200－V200－W300－X1－Y1.6**
(D) (L) (V) (W) (X) (Y)

Vertical insertion die


Top
HL/3
HL/3
HL/3
1.4
1
1.6
Ground
Wattage rate
Heater surface temperature
Work piece surface temperature

Ordering example) **MKCHA12－200－V200－W300－X1.6－Y1.4**
(D) (L) (V) (W) (X) (Y)

＊In the above wattage rate example, the wattage rate, heater surface temperature and surface temperature of the work piece are reference values.
The temperature distribution of the heated work piece varies with the characteristics of the work piece (shape, size, material, heat dissipation), heater distribution and various other conditions, so the actual value will be different from the above.

CARTRIDGE HEATERS

—OUTPUT SELECTION TYPE—

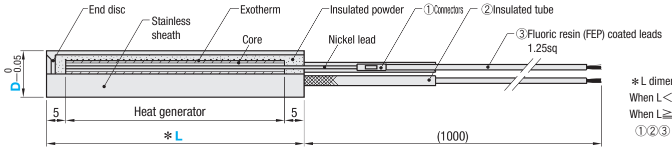
CARTRIDGE HEATERS/BOLTS FOR CARTRIDGE HEATER

—OUTPUT DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

MCH


End disc
Stainless sheath
Exotherm
Core
Insulated powder
Nickel lead
①Connectors
②Insulated tube
③Fluoric resin (FEP) coated leads 1.25sq
D 0 −0.05
5
Heat generator
5
＊L
(1000)

＊L dimension and allowable curving

When L＜300 0.02 or less

When L≧300 0.05 or less

①②③ Heat resistance: 180˚C or lower

M SUS304

V (Voltage)	W (Wattage)	W/cm² (Watt density)	Part Number Type	Part Number D	L	U/Price 1~9
200	130	5.8	MCH	8	100	Quotation
	200	7.1		10	100	
	300	8.0			130	
	400	9.1			150	
	400	7.5			180	
	450	7.5			200	
	480	5.3			300	
	400	11.2		12.6	100	
	550	11.6			130	
	700	12.6			150	
	800	11.9			180	
	900	11.6			200	
	950	10.5			250	
	1200	10.5			300	
	400	5.7		16	150	
	550	6.4			180	
	650	6.8			200	
	750	6.2			250	
	1000	6.9			300	

Coupling nipples···MCHB (D8～16) ☞right page

Order

Part Number	—	L
MCH 12.6	—	250

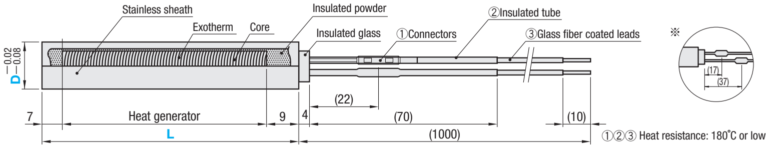
Days to Ship Quotation

Price Quotation

Example ☞right page

RoHS

MCHV


Stainless sheath
Exotherm
Core
Insulated powder
Insulated glass
①Connectors
②Insulated tube
③Glass fiber coated leads
※
(17)
(37)
D −0.02 −0.08
7
Heat generator
9
4
(22)
(70)
(10)
L
(1000)

①②③ Heat resistance: 180˚C or lower

M SUS321

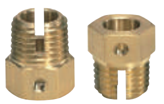
※ Connector position (22) becomes two separative positions 17 and 37 for two connectors when D6, 6.5 and 8.

V (Voltage)	W (Wattage)	W/cm² (Watt density)	Lead nominal cross-sectional area [mm²,sq]	Part Number Type	Part Number D	L	V	W	U/Price 1~9
100	50	7.6	0.75	MCHV	6	50	100	50	Quotation
	100	6.2				100		100	
200	110	14.5			6.5	50	200	110	
	250	14.1				100		250	
	330	14.2				130		330	
	400	14.3				150		400	
100	120	14.0			8	50	100	120	
200	320	15.2				100	200	320	
	350	12.2				130		350	
	250	7.4				150		250	
	500	14.8						500	
	300	7.3				180		300	
	450	10.9						450	
	620	15.0						620	
	500	10.8				200		500	
	690	14.9						690	
	800	17.2						800	
	900	15.3				250		900	

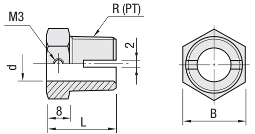
Coupling nipples···MCHB ⊗ Coupling nipple SCHL cannot be used.

V (Voltage)	W (Wattage)	W/cm² (Watt density)	Lead nominal cross-sectional area [mm²,sq]	Part Number Type	Part Number D	L	V	W	U/Price 1~9
100	350	13.3	0.75	MCHV	10	100	100	350	Quotation
200	250	12.4				80	200	250	
	300	11.4				100		300	
	400	15.2						400	
	550	13.1				150		550	
	630	15.0						630	
	750	17.7						750	
	750	14.6				180		750	
	450	7.6				200		450	
	650	11.3						650	
	860	14.9						860	
	1000	17.2						1000	
	550	7.5				250		550	
	880	12.0						880	
	1100	15.0	1.25					1100	
	1300	17.6						1300	
	1100	12.3				300		1100	
	480	15.2			12	100		480	
	650	12.9				150		650	
	1050	15.1				200		1050	
	1300	14.7				250		1300	
	1500	16.9	2.0					1500	
	890	15.1	1.25		14	150		890	

Coupling nipples···MCHB ⊗ Coupling nipple SCHL cannot be used.



MCHB (Bolts for Cartridge Heater)


M3
R (PT)
d
2
8
L
B

M Brass (C3604)

d	B	L	R (PT)	Part Number Type	Part Number No.	U/Price 1~9
6.1	14	18	1/8	MCHB	6	Quotation
6.6	17		1/4		6.5	
8.1					8	
10.1	21	20	3/8		10	
12.1	24	25	1/2		12	
12.7					12.6	
14.1					14	
16.1	28	27	3/4		16	

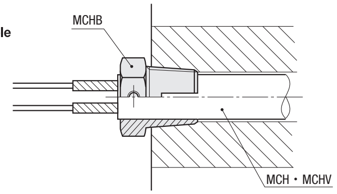
Order

Part Number	—	L	—	V	—	W
MCHV10	—	100	—	V200	—	W400
MCHB8						

Price Quotation

Days to Ship Quotation

Example


MCHB
MCH・MCHV

- Having a thread that is shallower than ordinary tapered threads, it enables to fasten a cartridge heater by simply tightening.
- Fix the heater bolt and heater more firmly by M3 bolts from the side surface, if the tightening is weak.

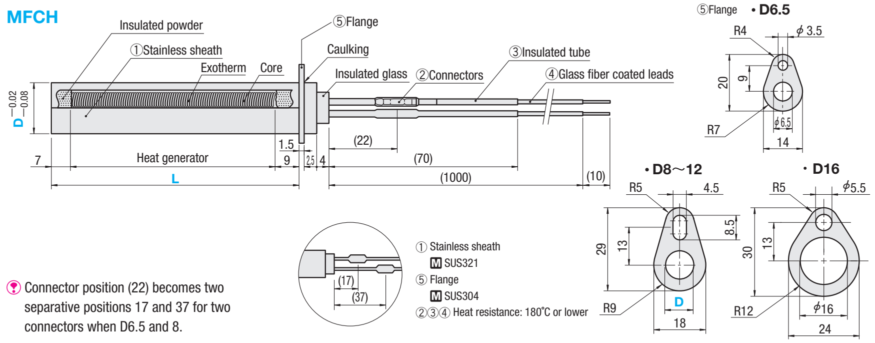
Do not use with a heater of watt density over 15W/cm².

CARTRIDGE HEATERS

—WITH STOPPER FLANGE—

RoHS

MFCH



Insulated powder
⑤Flange
①Stainless sheath
Caulking
③Insulated tube
Exotherm
Core
Insulated glass
②Connectors
④Glass fiber coated leads
D -0.02 -0.08
1.5
(22)
7
Heat generator
9
2.5
4
(70)
L
(1000)
(10)
⑤Flange • D6.5
R4
ϕ3.5
20
9
R7
ϕ6.5
14
• D8～12
R5
4.5
8.5
29
13
R9
D
18
• D16
R5
ϕ5.5
30
13
R12
ϕ16
24
(17)
(37)

① Stainless sheath
M SUS321
⑤ Flange
M SUS304
②③④ Heat resistance: 180℃ or lower

Connector position (22) becomes two separative positions 17 and 37 for two connectors when D6.5 and 8.

V (Voltage)	W (Wattage)	W/cm² (Watt density)	Lead nominal cross-sectional area [mm²,sq]	Part Number Type	D	L	V	W	U/Price 1～9
200	110	15.9	0.75	MFCH	6.5	50	200	110	Quotation
	250	14.6				100		250	
	320	15.2			8	100		320	
	270	8.0				150		270	
	500	14.9						500	
	330	8.0				180		330	
	620	15.0						620	
	500	10.8				200		500	
	690	14.9						690	
	800	17.3						800	
	700	11.9				250		700	
	500	11.9			10	150		500	
	720	14.0				180		720	
	450	7.8				200		450	
	650	11.3						650	
	860	14.9						860	
	880	12.0				250		880	
	1100	15.0	1.25					1100	
	700	11.3			12	180		700	
	820	11.8				200		820	
	1050	15.1						1050	
	1300	14.7				250		1300	
	1200	13.0			16	200		1200	
	1500	10.5	2.0			300		1500	

Color of insulated glass of D16 is white, instead of pink for other D dimensions, however, no difference in quality compared with other D dimensions of D6.5～12 with pink color.

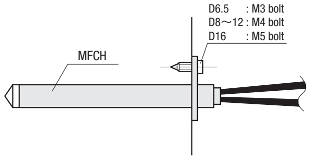
Order

Part Number	—	L	—	V	—	W
MFCH10	—	200	—	V200	—	W450

Price Quotation

Days to Ship Quotation

Example



D6.5 : M3 bolt
D8～12 : M4 bolt
D16 : M5 bolt
MFCH

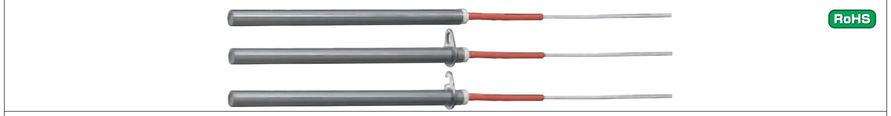
■**Characteristics**

- A flange prevents the cartridge heaters coming off from the mold.
- The plate side hole processing of flange is the same with MCHJ (P.1149). (D8～12)

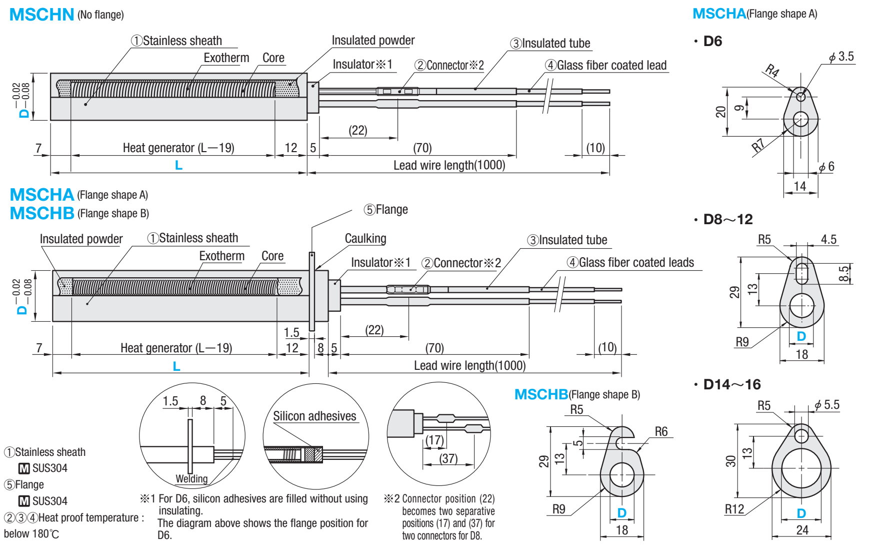
CARTRIDGE HEATERS

—L DIMENSION • WATTAGE • FLANGE SELECTION—

Non JIS material definition is listed on P.1351 - 1352



RoHS



MSCHN (No flange)
①Stainless sheath
Insulated powder
③Insulated tube
Exotherm
Core
Insulator※1
②Connector※2
④Glass fiber coated lead
D -0.02 -0.08
(22)
7
Heat generator (L—19)
12
5
(70)
(10)
L
Lead wire length(1000)
MSCHA (Flange shape A)
MSCHB (Flange shape B)
⑤Flange
Insulated powder
①Stainless sheath
Caulking
③Insulated tube
Exotherm
Core
Insulator※1
②Connector※2
④Glass fiber coated leads
1.5
(22)
7
Heat generator (L—19)
12
8
5
(70)
(10)
L
Lead wire length(1000)
1.5
8
5
Silicon adhesives
Welding
(17)
(37)
MSCHB (Flange shape B)
R5
R6
5
29
13
R9
D
18
MSCHA (Flange shape A)
• D6
R4
ϕ3.5
20
9
R7
ϕ6
14
• D8～12
R5
4.5
8.5
29
13
R9
D
18
• D14～16
R5
ϕ5.5
30
13
R12
D
24

①Stainless sheath
M SUS304
⑤Flange
M SUS304
②③④Heat proof temperature : below 180℃

※1 For D6, silicon adhesives are filled without using insulating. The diagram above shows the flange position for D6.

※2 Connector position (22) becomes two separative positions (17) and (37) for two connectors for D8.

W density (W/cm²)	Part Number Type	D	L 1mm increments	V (Voltage) Selection	W (Wattage) 10W increments
2≦W/cm²≦15 W/cm²=W/{D×(L—19)×3.14/100}	MSCHN(No flange) MSCHA(Flange shape A) MSCHB(Flange shape B)	*6	50～200	200 220	50～ 520
		8	50～400		50～1100
		10	50～600		50～2000
		12			
		*14			
		*15			
		*16			

Specify the wattage such that the W density (W/cm²) is within the range 2≦W/cm²≦15. MSCHB is not available for *D6 • D14 • D15 • D16.

Order

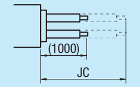
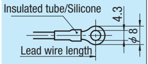
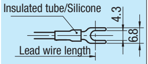
Part Number	—	L	—	V	—	W
MSCHN8	—	150	—	V200	—	W 400
MSCHA12	—	300	—	V220	—	W1400
MSCHB10	—	200	—	V200	—	W 600

Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	V	—	W	—	(JC • M4 • G4)
MSCHN8	—	200	—	V200	—	W 600	—	JC2
MSCHB10	—	400	—	V220	—	W1300	—	JC2—M4

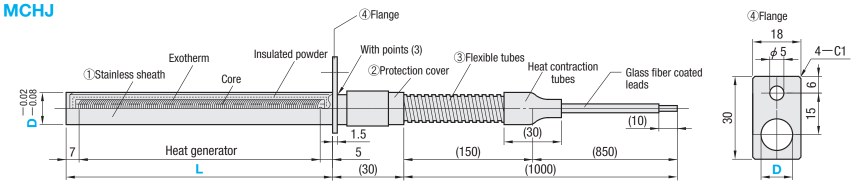
Alterations	Code	Spec.	1Code
 (1000) JC	JC	Change the length of the lead wire. Designation method: JC2 — Lead wire length (mm): 2000 Designation method: JC3 — Lead wire length (mm): 3000	Quotation
 Insulated tube/Silicone 4.3 ϕ8 Lead wire length	M4	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/Silicone 4.3 6.8 Lead wire length	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

CARTRIDGE HEATERS

—WITH STOPPER FLANGE・LEAD PROTECTION COVER—

RoHS

MCHJ


④Flange
With points (3)
Exotherm
Insulated powder
①Stainless sheath
Core
②Protection cover
③Flexible tubes
Heat contraction tubes
Glass fiber coated leads
D −0.02 −0.08
1.5
(30)
(10)
7
Heat generator
5
(150)
(850)
L
(30)
(1000)
④Flange
18
ϕ5
4—C1
6
15
30
D

Installation method of flange is caulking or welding (3 points).

①Stainless sheath	②Protection cover	③Flexible tubes	④Flange	
D10・12 M SUS321 D8 M SUS316L	M SUS321	M SUS304	M SUS304	Lead heat resistance temperature 180°C

V (Voltage)	W (Wattage)	W/cm² (Watt density)	Lead nominal cross-sectional area [mm²,sq]	Part Number		L	V	W	U/Price
				Type	D				1~9
100	120	12.6	0.75	MCHJ	8	50	100	120	Quotation
200	320	14.5				100	200	320	
	280	8.1				150		280	
	500	14.4						500	
	350	8.3				180		350	
	620	14.7						620	
	500	10.8				200		500	
	690	14.6						690	
	800	17.2						800	
	650	10.9				250		650	
	400	14.5			10	100	200	400	
	300	8.1				130		300	
	400	9.2				150		400	
	630	14.5						630	
	400	7.6				180		400	
	450	7.6				200		450	
	650	11.3						650	
	860	14.6						860	
	1000	17.2						1000	
	600	8.0				250		600	
	880	12.0						880	
	1100	14.7	1.25					1100	
	1300	15.2						1300	
	1300	14.4				300		1300	
	480	14.5			12	100	200	480	
	650	12.5				150		650	
	800	12.6				180		800	
	900	12.7				200		900	
	1050	14.8						1050	
	950	10.6				250		950	
	1300	14.5	2.0					1300	
	1500	16.9						1500	

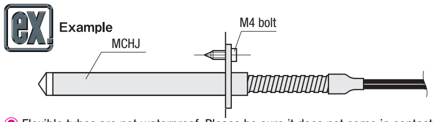
Order

Part Number	—	L	—	V	—	W
MCHJ10	—	100	—	V200	—	W400

Price Quotation

Days to Ship Quotation

Example


M4 bolt
MCHJ

■Characteristics

- A flange prevents cartridge heater coming off from the mold.
- Protection cover at the bottom prevents from directly pulling the lead when removing the heater.
- Flexible tube prevents lead from breaking caused by fatigue when heater is used on the movable side.
- Minimum bending R of flexible tubes

D	R
8	27.5
10	37.5
12	37.5

Flexible tubes are not waterproof. Please be sure it does not come in contact with water.

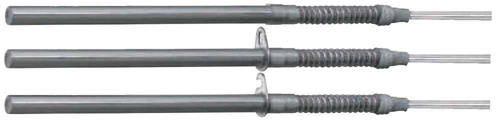
- The plate side hole processing of flange is the same with MFCH (P.1147). (D8～12)

CARTRIDGE HEATERS

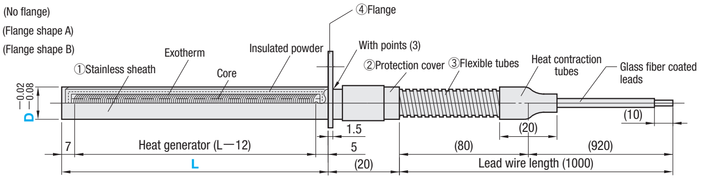
—L, W, FLANGE SELECTION TYPE・LEAD PROTECTION COVER—

Non JIS material definition is listed on P.1351 - 1352

RoHS



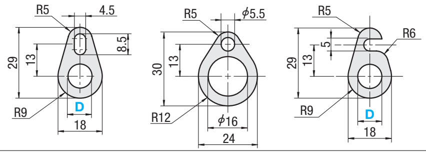
MJCHN (No flange)
MJCHA (Flange shape A)
MJCHB (Flange shape B)


④Flange
With points (3)
Exotherm
Insulated powder
①Stainless sheath
Core
②Protection cover
③Flexible tubes
Heat contraction tubes
Glass fiber coated leads
D −0.02 −0.08
1.5
(20)
(10)
7
Heat generator (L—12)
5
(80)
(920)
L
(20)
Lead wire length (1000)

MJCHA (Flange shape A)

・D8～12 ・D16

MJCHB (Flange shape B)


R5
4.5
8.5
29
13
R9
D
18
R5
ϕ5.5
30
13
R12
ϕ16
24
R5
R6
5
29
13
R9
D
18

①Stainless sheath	③Flexible tubes
M SUS304	M SUS304
②Protection cover	④Flange
M SUS304	M SUS304
	Lead heat resistance temperature 180°C

Installation method of flange is caulking or welding (3 points).

Watt density (W/cm²)	Part Number		L 1mm increments	V (Voltage) Selection	W (Wattage) 10W increments
	Type	D			
2≦W/cm²≦15 W/cm²=W/{D×(L—12)×3.14/100}	MJCHN (No flange) MJCHA (Flange shape A) MJCHB (Flange shape B)	8	50～400	200 220	50～1100
		10			50～1600
		12			50～1800
	MJCHN (No flange) MJCHA (Flange shape A)	*16	50～600		50～2000

Specify the wattage such that the W density (W/cm²) is within the range 2≦W/cm²≦15. ⊗*MJCHB: Not available for D16

Order

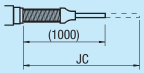
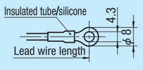
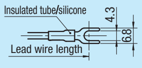
Part Number	—	L	—	V	—	W
MJCHN 8	—	150	—	V200	—	W 400
MJCHA12	—	300	—	V220	—	W1400
MJCHB10	—	200	—	V200	—	W 600

Days to Ship Quotation

Price Quotation

Alterations

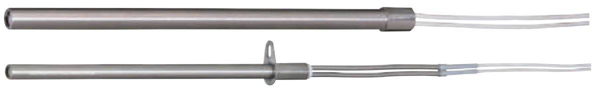
Part Number	—	L	—	V	—	W	—	(JC・M4・G4)
MJCHN8	—	200	—	V200	—	W 600	—	JC2
MJCHB10	—	400	—	V220	—	W1400	—	JC2—M4

Alterations	Code	Spec.	1Code
 (1000) JC	JC	Change the length of the lead wire. Specification method: JC2 — Lead wire length (mm): 2000 Specification method: JC3 — Lead wire length (mm): 3000	Quotation
 Insulated tube/silicone Lead wire length 4.3 ϕ8	M4	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/silicone Lead wire length 4.3 6.8	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

CARTRIDGE HEATERS, WITH LEAD WIRE BOTTOM REINFORCED TYPE

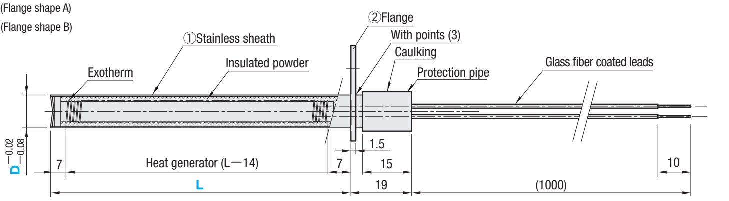
—L, W, FLANGE SELECTION TYPE—

RoHS

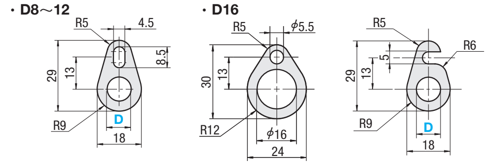


※When alteration SP is used

MNCHN (No flange)
MNCHA (Flange shape A)
MNCHB (Flange shape B)


②Flange
With points (3)
Caulking
①Stainless sheath
Exotherm
Insulated powder
Protection pipe
Glass fiber coated leads
D −0.02 −0.08
7
Heat generator (L−14)
7
1.5
15
10
19
L
(1000)

MNCHA (Flange shape A) **MNCHB** (Flange shape B)


· D8～12
R5
4.5
8.5
29
13
R9
D
18
· D16
R5
ϕ5.5
30
13
R12
ϕ16
24
R5
R6
5
29
13
R9
D
18

①Stainless sheath
M SUS304
②Flange
M SUS304
Lead heat resistance temperature 180˚C

Installation method of flange is caulking or welding (3 points).

Watt density (W/cm²)	Part Number Type	D	L 1mm increments	V (Voltage) Selection	W (wattage) 10W increments
2≦W/cm²≦15 W/cm²=W/ {D×(L−14)×3.14/100}	**MNCHN** (No flange) **MNCHA** (Flange shape A) **MNCHB** (Flange shape B)	8	50～400	200 220	50～1100
		10			50～1600
		12			50～1800
	MNCHN (No flange) **MNCHA** (Flange shape A)	*16	50～600		50～2000

Specify the wattage such that the W density (W/cm²) is within the range 2≦W/cm²≦15. ⊗ * MNCHB: Not available for D16

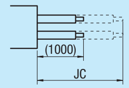
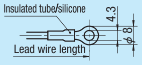
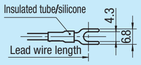
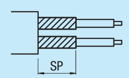
Order

Part Number	—	L	—	V	—	W
MNCHN 8	—	150	—	V200	—	W 400
MNCHA12	—	300	—	V220	—	W1400
MNCHB10	—	200	—	V200	—	W 600

Days to Ship Quotation

Price Quotation

Alterations ☎ Part Number — L — V — W — (JC · M4 · G4 · SP)
MNCHN 8 — 200 — V200 — W 600 — JC2
MNCHB10 — 400 — V220 — W1400 — JC2 — M4

Alterations	Code	Spec.	1Code
	JC	Change the length of the lead wire. Specification method / Lead wire length (mm) JC2 / 2000 JC3 / 3000	
	M4	Fit round crimped terminal (M4) onto lead wire.	Quotation
	G4	Fit Y-type crimped terminal (M4) onto lead wire.	
	SP	Attach the spring that protects the lead. Designation method / Length of protective spring (mm) SP100 / 100 SP200 / 200 SP300 / 300	

(1000)
JC
Insulated tube/silicone
4.3
ϕ8
Lead wire length
Insulated tube/silicone
4.3
6.8
Lead wire length
SP

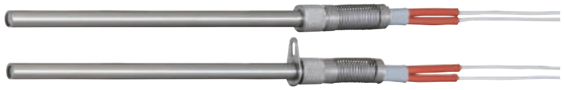
■**Characteristics:**
- Can prevent disconnection fault by reinforcing the bottom part of lead wire.
- Can save storage space as short in length from flange to the lead wire bottom.
- By designating alteration SP and protecting lead with spring, the bending force applied on the lead is relieved and breakage will not occur easily.

CARTRIDGE HEATERS —WITH KNURL CAP—

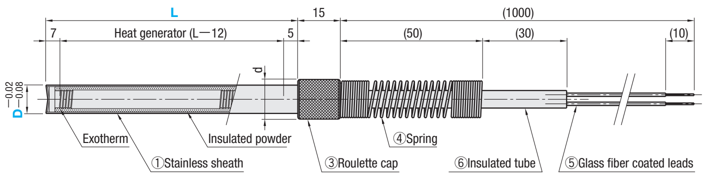
—L, W, FLANGE SELECTION TYPE—

Non JIS material definition is listed on P.1351 - 1352

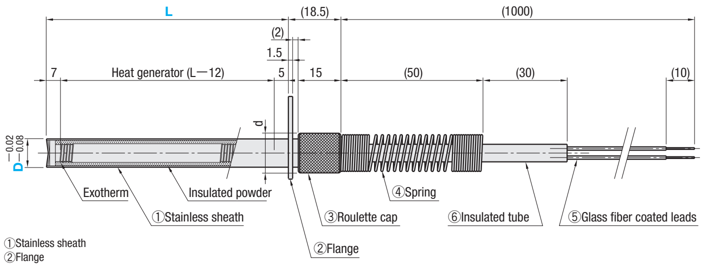
RoHS



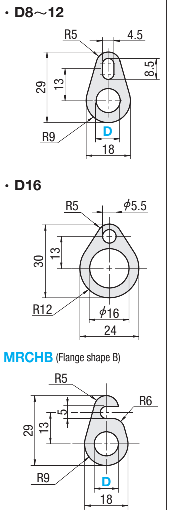
MRCHN (No flange)


L
15
(1000)
7
Heat generator (L−12)
5
(50)
(30)
(10)
d
D −0.02 −0.08
Exotherm
Insulated powder
④Spring
①Stainless sheath
③Roulette cap
⑥Insulated tube
⑤Glass fiber coated leads

MRCHA (Flange shape A)
MRCHB (Flange shape B)


L
(18.5)
(1000)
(2)
1.5
7
Heat generator (L−12)
5
15
(50)
(30)
(10)
d
D −0.02 −0.08
Exotherm
Insulated powder
④Spring
①Stainless sheath
③Roulette cap
⑥Insulated tube
⑤Glass fiber coated leads
②Flange

MRCHA (Flange shape A)


· D8～12
R5
4.5
8.5
29
13
R9
D
18
· D16
R5
ϕ5.5
30
13
R12
ϕ16
24
MRCHB (Flange shape B)
R5
R6
5
29
13
R9
D
18

①Stainless sheath
②Flange
③Caps
④Spring
M SUS304
⑤Glass fiber coated leads
⑥Insulated tube
Heat resistance: 180˚C or lower

Can also be used by removing the spring.

d	Watt density (W/cm²)	Part Number Type	D	L 1mm increments	V (Voltage) Selection	W (Wattage) 10W increments
12	2≦W/cm²≦15 W/cm²=W/ {D×(L−12)×3.14/100}	**MRCHN** (No flange) **MRCHA** (Flange shape A) **MRCHB** (Flange shape B)	8	50～400	200 220	50～1100
14			10			50～1600
16			12			50～1800
20		**MRCHN** (No flange) **MRCHA** (Flange shape A)	*16	50～600		50～2000

Specify the wattage such that the W density (W/cm²) is within the range 2≦W/cm²≦15. ⊗ * MRCHB: Not available for D16

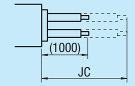
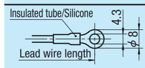
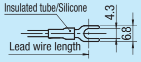
Order

Part Number	—	L	—	V	—	W
MRCHN 8	—	150	—	V200	—	W 400
MRCHA12	—	300	—	V220	—	W1400
MRCHB10	—	200	—	V200	—	W 600

Days to Ship Quotation

Price Quotation

Alterations ☎ Part Number — L — V — W — (JC · M4 · G4)
MRCHN 8 — 200 — V200 — W 600 — JC2
MRCHB10 — 400 — V220 — W1300 — JC2 — M4

Alterations	Code	Spec.	1Code
	JC	Change the length of the lead wire. Designation / Lead wire length (mm) JC2 / 2000 JC3 / 3000	Quotation
	M4	Fit round crimped terminal (M4) onto lead wire.	
	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

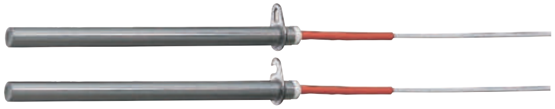
(1000)
JC
Insulated tube/Silicone
4.3
ϕ8
Lead wire length
Insulated tube/Silicone
4.3
6.8
Lead wire length

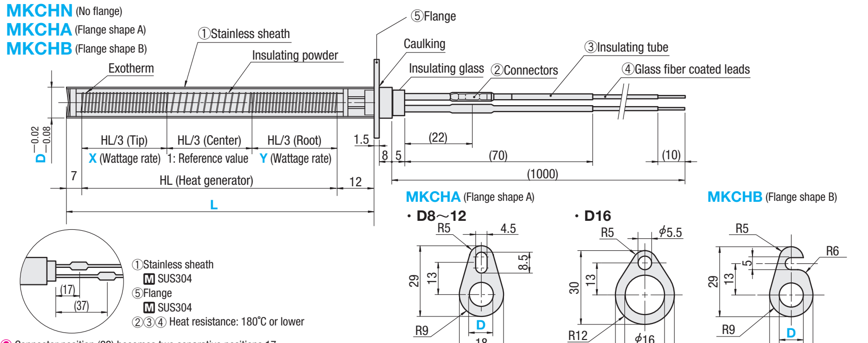
■**Features** The heater can be removed by holding the roulette cap, thus preventing damage to the lead wire or heat generating part of the heater.

CARTRIDGE HEATERS SOAKING TYPE

—L, W, FLANGE SELECTION TYPE—

RoHS




MKCHN (No flange)
MKCHA (Flange shape A)
MKCHB (Flange shape B)
①Stainless sheath
Insulating powder
Exotherm
⑤Flange
Caulking
Insulating glass
②Connectors
③Insulating tube
④Glass fiber coated leads
D −0.02 −0.08
HL/3 (Tip)
HL/3 (Center)
HL/3 (Root)
X (Wattage rate)
1: Reference value
Y (Wattage rate)
1.5
8
5
(22)
(70)
(10)
(1000)
7
HL (Heat generator)
12
L
(17)
(37)
MKCHA (Flange shape A)
・D8～12
R5
4.5
8.5
29
13
R9
D
18
・D16
R5
ϕ5.5
30
13
R12
ϕ16
24
MKCHB (Flange shape B)
R5
R6
5
29
13
R9
D
18

①Stainless sheath
Ⓜ SUS304
⑤Flange
Ⓜ SUS304
②③④ Heat resistance: 180˚C or lower

Connector position (22) becomes two separative positions 17 and 37 for two connectors when D8.

Part Number		L	V (Voltage)	W (Total wattage)	X (Wattage rate)	Y (Wattage rate)
Type	D	1mm increments	Selection	10W increments	0.1 increments	0.1 increments
MKCHN (No flange) **MKCHA** (Flange shape A) **MKCHB** (Flange shape B)	8	100～400	200 220	100～1100	1.0～2.0	1.0～2.0
	10			100～1600		
	12			100～1800		
	＊16	100～600		100～2000		

Watt density limit $2 \leqq$ Watt density (W/cm^2) $\leqq 15$

＊MKCHB: Not available for D16

Tip: $2 \leqq W \times \frac{X}{X+Y+1} \div (D \times \frac{HL}{3} \times 3.14 \div 100) \leqq 15$

Root: $2 \leqq W \times \frac{X}{X+Y+1} \div (D \times \frac{HL}{3} \times 3.14 \div 100) \leqq 15$

Center: $2 \leqq W \times \frac{1}{X+Y+1} \div (D \times \frac{HL}{3} \times 3.14 \div 100) \leqq 15$

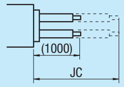
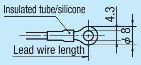
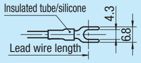
Order

Part Number	—	L	—	V	—	W	—	X	—	Y
MKCHA 8	—	200	—	V220	—	W300	—	X1.4	—	Y1.6
MKCHB10	—	300	—	V200	—	W700	—	X1.4	—	Y1.6

Days to Ship Quotation

Alterations

Part Number — L — V — W — X — Y — (JC · M4 · G4)
MKCHA12 — 300 — V220 — W1200 — X1.4 — Y1.6 — JC3 — M4

Alterations	Code	Spec.	1Code
 (1000) JC	JC	Change the length of the lead wire. Specification method / Lead wire length (mm) JC2 / 2000 JC3 / 3000	Quotation
 Insulated tube/silicone Lead wire length 4.3 ϕ8	M4	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/silicone Lead wire length 4.3 6.8	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

Price Quotation

● Wattage rate

The overall wattage (W) of the entire heater indicates the ratio of the distribution to each part.

You can specify the wattage of the tip and the root as multiples, based on a reference value of 1 for the center.

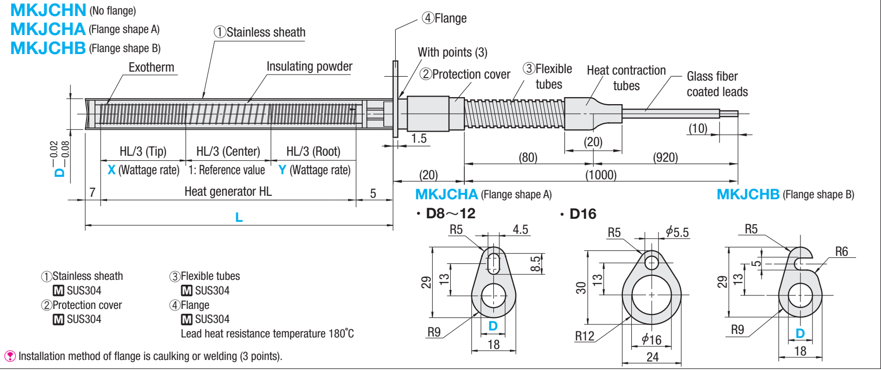
Outline of cartridge heater soaking type ☞ P.1143

CARTRIDGE HEATERS SOAKING TYPE

—L, W, FLANGE SELECTION TYPE・LEAD PROTECTION COVER—

Non JIS material definition is listed on P.1351 - 1352

RoHS


MKJCHN (No flange)
MKJCHA (Flange shape A)
MKJCHB (Flange shape B)
①Stainless sheath
Exotherm
Insulating powder
④Flange
With points (3)
②Protection cover
③Flexible tubes
Heat contraction tubes
Glass fiber coated leads
D −0.02 −0.08
HL/3 (Tip)
HL/3 (Center)
HL/3 (Root)
X (Wattage rate)
1: Reference value
Y (Wattage rate)
1.5
(10)
(20)
(80)
(920)
(20)
(1000)
7
Heat generator HL
5
L
MKJCHA (Flange shape A)
・D8～12
R5
4.5
8.5
29
13
R9
D
18
・D16
R5
ϕ5.5
30
13
R12
ϕ16
24
MKJCHB (Flange shape B)
R5
R6
5
29
13
R9
D
18

①Stainless sheath
Ⓜ SUS304
②Protection cover
Ⓜ SUS304
③Flexible tubes
Ⓜ SUS304
④Flange
Ⓜ SUS304
Lead heat resistance temperature 180˚C

Installation method of flange is caulking or welding (3 points).

Part Number		L	V (Voltage)	W (Total wattage)	X (Wattage rate)	Y (Wattage rate)
Type	D	1mm increments	Selection	10W increments	0.1 increments	0.1 increments
MKJCHN (No flange) **MKJCHA** (Flange shape A) **MKJCHB** (Flange shape B)	8	100～400	200 220	100～1100	1.0～2.0	1.0～2.0
	10			100～1600		
	12			100～1800		
	＊16	100～600		100～2000		

Watt density limit $2 \leqq$ Watt density (W/cm^2) $\leqq 15$

＊MKJCHB: Not available for D16

Tip: $2 \leqq W \times \frac{X}{X+Y+1} \div (D \times \frac{HL}{3} \times 3.14 \div 100) \leqq 15$

Root: $2 \leqq W \times \frac{X}{X+Y+1} \div (D \times \frac{HL}{3} \times 3.14 \div 100) \leqq 15$

Center: $2 \leqq W \times \frac{1}{X+Y+1} \div (D \times \frac{HL}{3} \times 3.14 \div 100) \leqq 15$

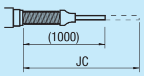
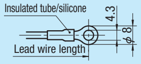
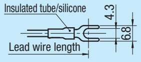
Order

Part Number	—	L	—	V	—	W	—	X	—	Y
MKJCHA12	—	300	—	V220	—	W1200	—	X1.4	—	Y1.6

Days to Ship Quotation

Alterations

Part Number — L — V — W — X — Y — (JC · M4 · G4)
MKJCHA8 — 180 — V220 — W500 — X1.4 — Y1.4 — JC3 — G4

Alterations	Code	Spec.	1Code
 (1000) JC	JC	Change the length of the lead wire. Specification method / Lead wire length (mm) JC2 / 2000 JC3 / 3000	Quotation
 Insulated tube/silicone Lead wire length 4.3 ϕ8	M4	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/silicone Lead wire length 4.3 6.8	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

Price Quotation

● Wattage rate

The overall wattage (W) of the entire heater indicates the ratio of the distribution to each part.

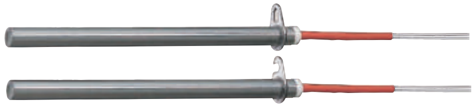
You can specify the wattage of the tip and the root as multiples, based on a reference value of 1 for the center.

Outline of cartridge heater soaking type ☞ P.1143

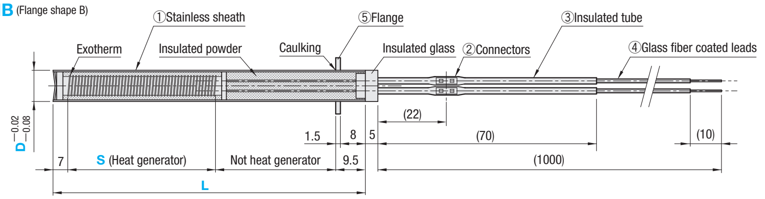
CARTRIDGE HEATERS HEATING TIP PART TYPE

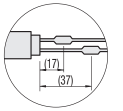
—L, W, FLANGE SELECTION TYPE—

RoHS



MTCHN (No flange)
MTCHA (Flange shape A)
MTCHB (Flange shape B)


①Stainless sheath
⑤Flange
③Insulated tube
Exotherm
Insulated powder
Caulking
Insulated glass
②Connectors
④Glass fiber coated leads
D −0.02 −0.08
(22)
1.5
8
5
(70)
(10)
7
S (Heat generator)
Not heat generator
9.5
(1000)
L

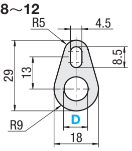


①Stainless sheath
M SUS304
⑤Flange
M SUS304
②③④ Heat resistance: 180˚C or lower

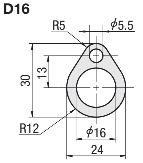
Connector position (22) becomes two separative positions 17 and 37 for two connectors when D8.

MTCHA (Flange shape A)

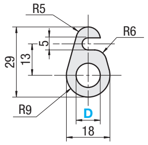
- **D8～12**


R5
4.5
29
13
8.5
R9
D
18

- **D16**


R5
ϕ5.5
30
13
R12
ϕ16
24

MTCHB (Flange shape B)


R5
R6
29
13
5
R9
D
18

Watt density (W/cm^2)	Part Number		L	S	V (Voltage)	W (wattage)
	Type	D	1mm increments	1mm increments	Selection	10W increments
2≦W/cm^2≦15 W/cm^2=W/ {D×S×3.14/100}	**MTCHN** (No flange) **MTCHA** (Flange shape A) **MTCHB** (Flange shape B)	8	50～400	30～380	200 220	50～1100
		10				50～1600
		12				50～1800
	MTCHN (No flange) **MTCHA** (Flange shape A)	*16	50～600	30～580		50～2000

Specify the wattage such that the W density (W/cm^2) is within the range 2≦W/cm^2≦15. ⊗ * MTCHB: Not available for D16

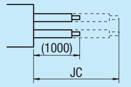
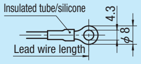
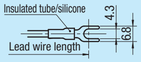
Order

Part Number	—	L	—	S	—	V	—	W
MTCHN 8	—	150	—	S100	—	V200	—	W 400
MTCHA12	—	300	—	S150	—	V220	—	W1400

Days to Ship Quotation

Alterations

Part Number	—	L	—	S	—	V	—	W	— (JC · M4 · G4)
MTCHN8	—	200	—	S100	—	V200	—	W 600	— JC2
MTCHB10	—	400	—	S200	—	V220	—	W1400	— JC2 — M4

Alterations	Code	Spec.	1Code
 (1000) JC	JC	Change the length of the lead wire. Specification method / Lead wire length (mm) JC2 / 2000 JC3 / 3000	Quotation
 Insulated tube/silicone, Lead wire length, 4.3, ϕ8	M4	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/silicone, Lead wire length, 4.3, 6.8	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

Price Quotation

■**Characteristics:**

Available to generate heat only for the core part of the heater which can prevent scraping troubles caused by difference of thermal expansion at the guide part.

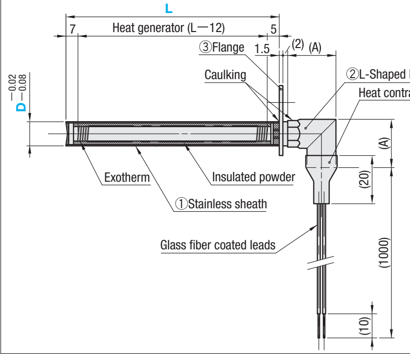
CARTRIDGE HEATERS —L FORM TYPE—

—L, W, FLANGE SELECTION TYPE—

Non JIS material definition is listed on P.1351 - 1352

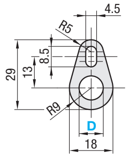
RoHS

MLCHN (No flange)
MLCHA (Flange shape A)
MLCHB (Flange shape B)
MLCHC (Flange shape C)

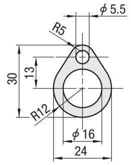

L
7
Heat generator (L—12)
5
③Flange
1.5
(2)
(A)
Caulking
②L-Shaped Pipe
Heat contraction tubes
D −0.02 −0.08
Exotherm
Insulated powder
①Stainless sheath
Glass fiber coated leads
(A)
(20)
(1000)
(10)

MLCHA (Flange shape A)

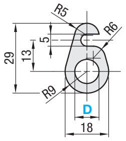
- **D8～12**


4.5
R5
29
13
8.5
R9
D
18

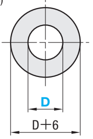
- **D16**


ϕ 5.5
R5
30
13
R12
ϕ 16
24

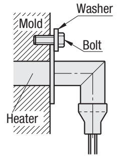
MLCHB (Flange shape B)


R5
R6
29
13
5
R9
D
18

MLCHC (Flange shape C)



■**Installation example for MLCHC (Flange shape C)**


Washer
Mold
Bolt
Heater

①: Install flange in between washer and bolt.
②: Available to freely decide and set the bolt position

①Stainless sheath
M SUS304
②L-Shaped Pipe
M SUS304
③Flange
M SUS304
Lead heat resistance temperature 180˚C

Watt density (W/cm^2)	A	Part Number		L	V (Voltage)	W (wattage)
		Type	D	1mm increments	Selection	10W increments
2≦W/cm^2≦15 W/cm^2=W/ {D×(L−12)×3.14/100}	20	**MLCHN** (No flange) **MLCHA** (Flange shape A) **MLCHB** (Flange shape B) **MLCHC** (Flange shape C)	8	50～400	200 220	50～1100
			10			50～1600
	22		12			50～1800
	25		*16	50～600		

Specify the wattage such that the W density (W/cm^2) is within the range 2≦W/cm^2≦15. ⊗ * MLCHB Not available for D16

Order

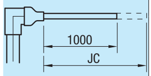
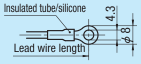
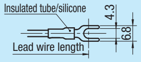
Part Number	—	L	—	V	—	W
MLCHN 8	—	150	—	V200	—	W 400
MLCHA12	—	300	—	V220	—	W1400
MLCHB10	—	200	—	V200	—	W 600

Days to Ship Quotation

Price Quotation

Alterations

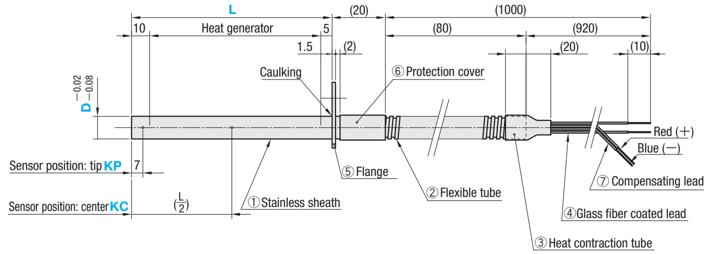
Part Number	—	L	—	V	—	W	— (JC · M4 · G4)
MLCHN 8	—	200	—	V200	—	W 600	— JC2
MLCHB10	—	400	—	V220	—	W1300	— JC2 — M4

Alterations	Code	Spec.	1Code
 1000 JC	JC	Change the length of the lead wire. Specification method / Lead wire length (mm) JC2 / 2000 JC3 / 3000	Quotation
 Insulated tube/silicone, Lead wire length, 4.3, ϕ8	M4	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/silicone, Lead wire length, 4.3, 6.8	G4	Fit Y-type crimped terminal (M4) onto lead wire.	

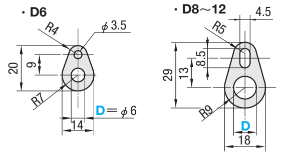
CARTRIDGE HEATERS

—L DIMENSION・WATTAGE・FLANGE SELECTION　SENSOR ATTACHED TYPE—

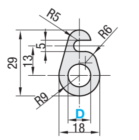
■**Features** : A cartridge heater and a temperature sensor (K type) are integrated in these products.
Ideally suited for limited space because there is no need to mount a heater and a temperature sensor separately.
In addition, temperature control of the heater itself by the sensor prevents shorts and ignition due to abnormal heating.


L
(20)
(1000)
10
Heat generator
5
(80)
(920)
1.5
(2)
(20)
(10)
Caulking
⑥Protection cover
D $^{-0.02}_{-0.08}$
Red (+)
Blue (−)
Sensor position: tip KP
7
⑤Flange
⑦Compensating lead
②Flexible tube
Sensor position: center KC
(L/2)
①Stainless sheath
④Glass fiber coated lead
③Heat contraction tube

MTSJCHA (Flange shape A)


・D6
R4
ϕ3.5
20
9
R7
14
D=ϕ6
・D8～12
4.5
R5
29
13
8.5
R9
D
18

MTSJCHB (Flange shape B)


・D8～12
R5
R6
29
13
5
R9
D
18

①Stainless sheath
②Flexible tube
⑤Flange
⑥Protection cover
M SUS304

④Glass fiber coated lead
Heat resistant temperature : 180℃

W density (W/cm²)	Part Number		L	V (Voltage)	W (Wattage)	Sensor position
	Type	D	1mm increments	Selection	10W increments	(K type) selection
2≦W/cm²≦15 W/cm²=W/{D×(L−15)×3.14/100}	**MTSJCHN** (No flange) **MTSJCHA** (Flange shape A) **MTSJCHB** (Flange shape B)	*6	50～200	200 220	50～ 520	**KP** : tip **KC** : center
		8	50～400		50～1100	
		10			50～1600	
		12			50～1800	

❢ Specify the wattage such that the W density (W/cm²) is within the range 2≦W/cm²≦15. ❢ *Flange shape B is not available for D6.

Order	Part Number	—	L	—	V	—	W	—	Sensor position
	MTSJCHA10	—	200	—	V200	—	W600	—	KP

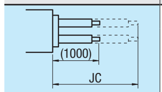
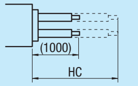
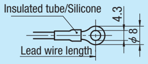
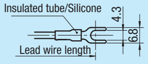
Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	V	—	W	—	Sensor position	—	(JC・HC・M4・G4)
MTSJCHA10	—	200	—	V200	—	W600	—	KP	—	JC2 — M4

Compensating lead wire length (mm)

Alterations	Code	Spec.	1Code
	**JC**	Change the length of the lead wire for a heater. Designation method / Lead wire length (mm) JC2 / 2000 JC3 / 3000	Quotation
	**HC**	Change the length of the compensation lead wire for a temperature sensor. Designation method / Compensating lead wire length (mm) HC2 / 2000 HC3 / 3000	
 Insulated tube/Silicone 4.3 ϕ8 Lead wire length	**M4**	Fit round crimped terminal (M4) onto lead wire.	
 Insulated tube/Silicone 4.3 6.8 Lead wire length	**G4**	Fit Y-type crimped terminal (M4) onto lead wire.	

■Band Heaters

RoHS

MBH

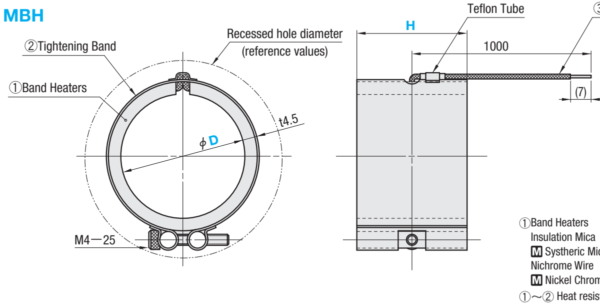

②Tightening Band
①Band Heaters
Recessed hole diameter
(reference values)
t4.5
φD
M4—25
H
Teflon Tube
③Leads
1000
(7)

Table of electric power (W) (±10%) Insulation resistance 10MΩ or more

H \ D	28	30	35	40	45	50
30	130	140	165	200	220	250
35	150	165	200	220	250	300
40	175	200	220	250	300	320
45	200	220	250	300	320	350
50	220	250	300	320	350	400
60	—	250	300	350	400	450
70	—	290	350	400	450	500
80	—	330	400	450	550	600
90	—	370	450	500	600	650
100	—	420	500	550	650	700

①Band Heaters
Insulation Mica
M Systheric Mica
Nichrome Wire
M Nickel Chrome ribbon wire

②Tightening band
M SUS430
③Leads
M Heat-resistant glass wire

①～② Heat resistance: 300˚C ③ Lead heat resistance temperature 180˚C

V (Voltage)	W/cm² (Watt density)	Recessed hole diameter (reference)	Part Number Type	Part Number D	H (Thickness of Band)	U/Price 1～9 H30～40	H45・50	H60・70	H80	H90・100
220	W/cm²＝W×100/(H×D×3.14)	(60)	MBH	28	30～50 (5mm increments) 60～100 (10mm increments)	Quotation		—	—	—
		(64)		30						
		(70)		35						
		(74)		40						
		(80)		45						
		(84)		50						

Order

Part Number	—	H
MBH28	—	40

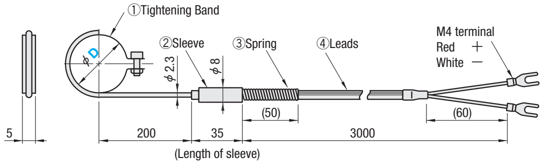
Days to Ship: Quotation

Price: Quotation

■Band Sensors

RoHS

SSMB (K type)


①Tightening Band
φD
②Sleeve
③Spring
④Leads
M4 terminal
Red ＋
White －
φ2.3
φ8
(50)
(60)
5
200
35
3000
(Length of sleeve)

The Highest use temperarure 450˚C

Use the sleeve at a temperature of no more than 90˚C.

M SUS304

Part Number Type	Part Number D	U/Price 1～9
SSMB	25	Quotation
	30	
	35	
	40	
	45	
	50	

Order

Part Number
SSMB30

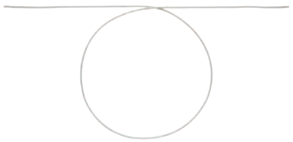
Days to Ship: Quotation

Price: Quotation

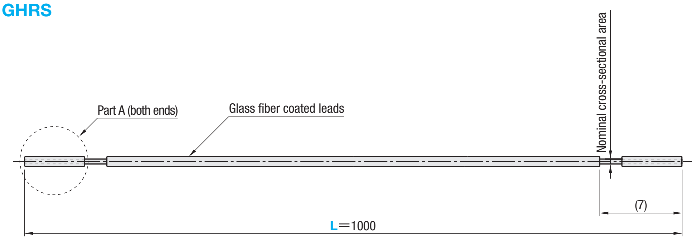
Non JIS material definition is listed on P.1351 - 1352

■Lead Wires For Heater

RoHS



10PACK—GHRS


Part A (both ends)
Glass fiber coated leads
Nominal cross-sectional area
(7)
L＝1000

Note: 10PACK-GHRS is the packing for 10 pcs.

Section A is stripped of coating, but a part of coating is left to facilitate operation.
Coating can be easily removed with hand.

Lead heat resistance temperature: 180˚C or lower

Lead nominal cross-sectional area [mm², (sq)]	Max. usable wattage At 100V	Max. usable wattage At 200V	Max. usable current (A)	Part Number PACK	Part Number Type	Part Number No.	L	U/Price 1～5 PACK
0.75	750	1500	7.5	10PACK	GHRS	0.75	1000	Quotation
1.25	1250	2500	12.5			1.25		
2	1750	3500	17.5			2		

Order

Part Number PACK	Part Number Type	Part Number No.	—	L
10PACK	—GHRS	1.25	—	1000

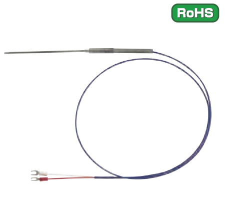
Days to Ship: Quotation

THERMOCOUPLES

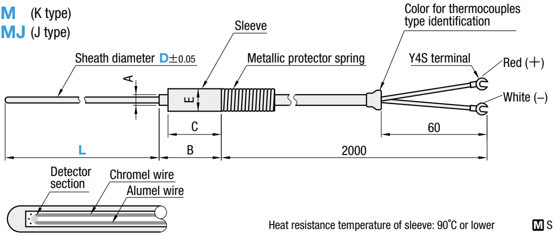
—SHEATHED THERMOCOUPLES・HEAT PROOF TYPE/COUPLING NIPPLE FOR THERMOCOUPLE—

■Sheathed Thermocouples

RoHS



SSM (K type)
SSMJ (J type)


Color for thermocouples type identification
Sleeve
Sheath diameter D±0.05
Metallic protector spring
Y4S terminal
Red (+)
White (–)
A
E
C
B
L
60
2000
Detector section
Chromel wire
Alumel wire

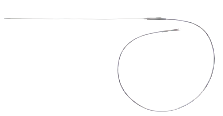
Heat resistance temperature of sleeve: 90˚C or lower

M SUS316

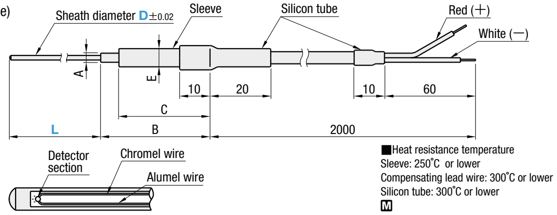
Thermocouples type (Color)	Strand resistance Ω/m	A	B	C	E	Max. usable temperature	Part Number Type	Part Number D	L 50mm increments	U/Price 1~9 L50	L100	L150	L200	L250	L300
K type (Blue)	52.0	2.7	35	30	6.0	500˚C	SSM	1	50~300						
	20.0					600˚C		1.6							
	9.8	4.5			8.0	700˚C		2.3							
	5.0					750˚C		3.2							
	2.25	6.3				800˚C		4.8					Quotation		
J type (Yellow)	33.6	2.7	35	30	6.0	450˚C	SSMJ	1	50~150					—	—
	12.8							1.6					—	—	—
	6.3	4.5			8.0	500˚C		2.3					—	—	—
	3.2					650˚C		3.2					—	—	—
	1.4	6.3				750˚C		4.8					—	—	—

■Sheathed Thermocouples

RoHS



TMK (K type)


Sheath diameter D±0.02
Sleeve
Silicon tube
Red (+)
White (–)
A
E
10
20
10
60
C
L
B
2000
Detector section
Chromel wire
Alumel wire

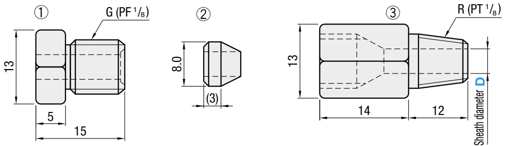
■Heat resistance temperature
Sleeve: 250˚C or lower
Compensating lead wire: 300˚C or lower
Silicon tube: 300˚C or lower

M
Sheath: SUS316
Sleeve: SUS303

※This product can be used under high temperature conditions.

Thermocouples type	Max. usable temperature	A	B	C	E	Part Number Type	Part Number D	L 50mm increments	U/Price 1~9 L50	L100	L150	L200	L250	L300
K type	650˚C	2.8	36	30	5.0	TMK	1.6	50~300						
	700˚C	4.5			7.0		2.3				Quotation			
	750˚C						3.2							
	800˚C	7.0			9.0		4.8							

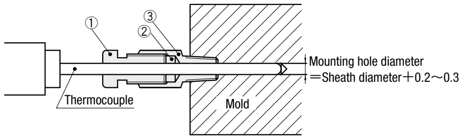
CSF


①
G (PF 1/8)
②
③
R (PT 1/8)
13
5
15
8.0
(3)
13
14
12
Sheath diameter D

M ①SUS304 ②Brass (C3604) ③SUS304

Part Number Type	D	U/Price 1~9
CSF	1	Quotation
	1.6	
	2.3	
	3.2	
	4.8	

Example Tightening the plug ① causes the component ② to tighten the thermocouple's sheath and firmly fasten it.


①
③
②
Thermocouple
Mold

Mounting hole diameter
=Sheath diameter+0.2~0.3

Order

Part Number	—	L
TMK1.6	—	100
SSM1	—	50
CSF 1		

Days to Ship Quotation

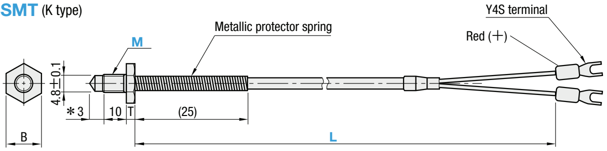
Price Quotation

THERMOCOUPLES

—SCREW TYPE—

Non JIS material definition is listed on P.1351 - 1352

SSMT (K type)


Y4S terminal
Metallic protector spring
Red (+)
M
4.8±0.1
∗3
10
T
(25)
B
L

Effective detection range (∗3mm)　Temperature measurement range: 0~300˚C　M SUS304

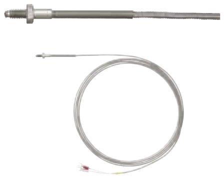
B	T	Part Number Type	Part Number M	L	U/Price 1~9 L1000	L2000	L4000
10	4	SSMT	6	1000 2000 4000	Quotation		
13	5.3		8				

Order

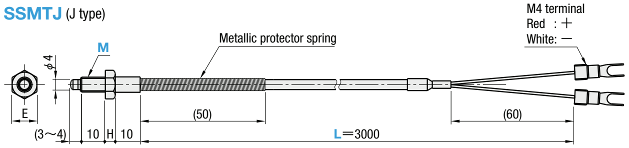
Part Number	—	L
SSMT6	—	1000

Days to Ship Quotation

Price Quotation



SSMTJ (J type)


M4 terminal
Red : +
White: –
Metallic protector spring
M
φ4
E
(3~4)
10
H
10
(50)
(60)
L=3000

Temperature measurement range: 0~300˚C　M SUS304

Max. usable temperature (˚C)	Tip Point Material	E	H	Part Number Type	Part Number M	L	U/Price 1~9	U/Price 10~19
300	SUS304	10	4	SSMTJ (J type)	6	3000	Quotation	

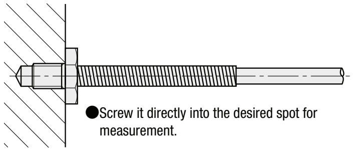
To be quoted on price & lead time above Max. Q'ty.

Order

Part Number	—	L
SSMTJ6	—	3000

Days to Ship Quotation

Example



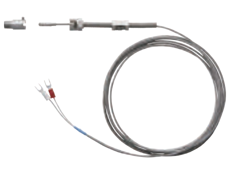
●Screw it directly into the desired spot for measurement.

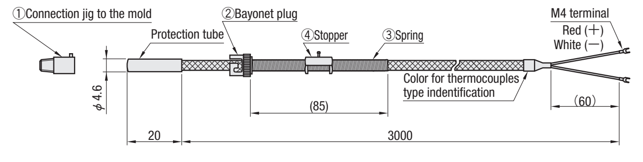
■Guide for thermocouples type

Thermocouples type	Color	+wire	−wire	Usable temperature	Max. usable temperature*	Application
K type	Blue	Chromel	Alumel	−200˚C~1000˚C	1200˚C	Most commonly used type for industrial applications. Exhibits a linear Alumel relationship between temperature and thermoelectromotive force.
J type	Yellow	Steel	Constantan	0˚C~ 600˚C	750˚C	Has high thermoelectromotive characteristics. Used in the medium temperature zone for industrial applications.

∗The maximum temperature used differs according to the strand diameter, so use it only as a rough guide.

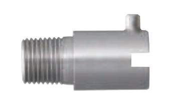
SSMH (K type)
SSMHJ (J type)



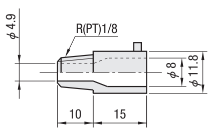

①Connection jig to the mold
②Bayonet plug
M4 terminal
Red (+)
White (−)
Protection tube
④Stopper
③Spring
Color for thermocouples type indentification
φ4.6
(85)
(60)
20
3000

Ⓜ Protection tube SUS304 ①②④Brass: Nickel plating ③SUS304

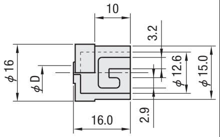
Complete parts (Not available for unbundled sales)



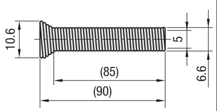
①Connection jig to the mold


φ4.9
R(PT)1/8
φ8
φ11.8
10
15

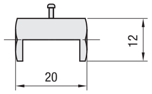
②Bayonet plug


10
3.2
φ16
φD
φ12.6
φ15.0
16.0
2.9

③Spring


10.6
5
6.6
(85)
(90)

④Stopper

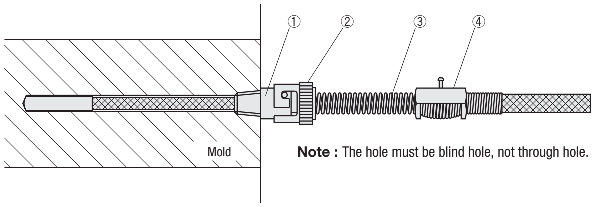


Thermocouples type (Color)	Thermocouples type	Strand resistance Ω/m	Max. usable temperature	Part Number	U/Price 1~9	U/Price 10~19
Blue	K type	9.0	300℃	SSMH4.9	Quotation	
Yellow	J type			SSMHJ4.9		

To be quoted on price & lead time above Max. Q'ty.

☎ **Order** Part Number SSMH4.9 **Days to Ship** Quotation

Example
1. Drill blind hole with RC (PT) 1/8 tapered female screw on the mold and fix connection jig to the mold (Parts ①)
2. Fix the stopper (Parts ④) on any place of thermocouple.
3. Hock connection jig (Parts ①) by spring (Parts ③).
4. Head of sensor tightly fits to the mold for constant temperature checking and easy removal.

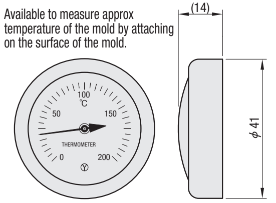


Note : The hole must be blind hole, not through hole.

Non JIS material definition is listed on P.1351 - 1352

M—HM (Simplified Thermometer with magnetic-backed)

Available to measure approx temperature of the mold by attaching on the surface of the mold.


(14)
φ41
100
50
150
0
200
THERMOMETER

Ⓜ SUS304
Ferrite magnet

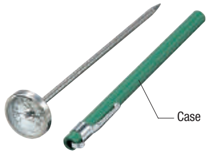
Temperature range (℃)	Scale (℃)	Recommended confirmation temperature range (℃)	Part Number Type	Part Number No.	U/Price 1~9
0~100	2	40~60	M—HM	10	Quotation
0~200	5	80~120		20	

☎ **Order** Part Number M—HM10 **Days to Ship** Quotation

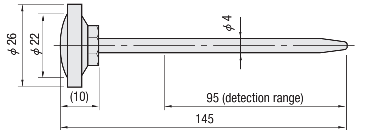
Price Quotation

■Features:

it can be attached to the mold surface for confirming rough temperature variation. It measures temperature by taking advantage of thermal expansion of bimetal, so it cannot be used as a precise temperature measurement instrument. The error of display temperature is about ±1 scale within the recommended temperature range for confirmation. (The display error is large outside the recommended temperature range for confirmation, so it is not recommended.)



TGU
(Simplified Thermometers)


φ26
φ22
φ4
(10)
95 (detection range)
145

Temperature measurement range: 0~200℃ Accuracy: ±5℃ within 0~200℃ range. Ⓜ SUS304

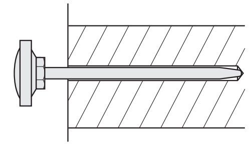
Part Number	U/Price 1~9	U/Price 10~19	U/Price 20~49	U/Price 50~100
TGU		Quotation		

To be quoted on price & lead time above Max. Q'ty.

☎ **Order** Part Number TGU

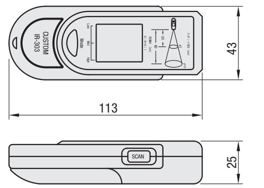
Days to Ship Quotation

Example

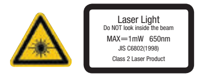


●Insert into a mold to see its approximate temperature.

TGR (Radiation thermometer)


43
113
SCAN
25

Ⓐ AAA battery ×2


Laser Light
Do NOT look inside the beam
MAX=1mW 650nm
JIS C6802(1998)
Class 2 Laser Product

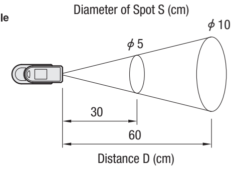
Measuring Range	−55~+350℃
Indication Unit	0.1˚C (−9.9~199.9˚C) 1˚C for other range
Measuring Accuracy	±2%rdg or ±3˚C, whichever bigger
Response Time	1 second
Emissivity	Variable with 0.01 increments in the range between 0.05 and 1.00

Temperature range (˚C)	Part Number	U/Price 1~9
−55~+350	TGR	Quotation

☎ **Order** Part Number TGR **Days to Ship** Quotation

Price Quotation

Example


Diameter of Spot S (cm)
φ10
φ5
30
60
Distance D (cm)

■Laser marker specifications

Division of Laser security : Class II
Wavelength : Red (650nm)
Energy radiation : MAX=1mW, JIS C6802(1988)
Class 2 Laser product

- Surface temperature is judged by checking infrared radiation of the object.
- When the surface of object reflects the light, secure with masking tape or coat with matt finish black color.

When measuring metal color, the measured temperature may be lower.

■Electrical specifications

Display	3.5 digits liquid crystal display (LCD)
Low battery indicator	When voltage of battery becomes below operating voltage "▭ or ▭"
Sampling	1 time/second
Operational temperature/ humidity	0℃~+50℃ (Subject to non condensing)
Storage temperature/ humidity	−20℃~+65℃
Power source	AAA battery (1.5V)×2※
Dimensions	43.5 (W)×113.5 (H)×24.5 (D) mm
Weight	Approx. 85g (including batteries)

※Batteries are packed for testing purpose. Recommend for early replacement with new batteries.

HEAT INSULATION SHEET

HEAT INSULATION SHEET

Product Name Part Number	Standard HIP□ HIPS−□H	Heat Proof HIPH□ HIPHS−□H	High Strength HIPX□ HIPXS−□H	High Temperature Proof HIPLS HIPLS−□H	High Strength/High Temperature Proof Grade−Thickness High Precision− HIPXTS HIPXTS−□H HIPGTS HIPGTS−□H
Page	1167	1169	1171	1173	1175

Bakelite Paper HIPP□ HIPPS−□H	Bakelite Cloth HIPC□ HIPCS−□H	Heat Insulation Sheets Bolt Hole Type HIP□−□D□4H□ HIP□−□D□6H□
1177	1179	1181

■Characteristics

①**High insulation・durability**
MISUMI insulation sheets (except Bakelite grades) use reliable materials consisting of glass fiber in frame and binding material with high durability.

②**Low pollution**
No asbestos is used that is harmful to health.

③**Lineups to meet various purposes**
We have various kinds of products to meet customer's needs.

■Characteristics comparison of MISUMI insulation sheets

Appropriate value Inferior 1 → 10 Excellent

Grade	Standard		Heat Proof		High Strength				High Temperature Proof				Bakelite Paper		Bakelite Cloth	
					Standard		Thickness high precision		Standard		Thickness high precision					
Standard type	HIP	P.1167	HIPH	P.1169	HIPX	P.1171	—	P.1175	—	P.1173	—	P.1175	HIPP	P.1177	HIPC	P.1179
A・B dimension designation type	HIPS		HIPHS		HIPXS		HIPXTS		HIPLS		HIPGTS		HIPPS		HIPCS	
Bolt hole type	HIPS−4H,6H		HIPHS−4H,6H		HIPXS−4H,6H		HIPXTS−4H,6H		HIPLS−4H,6H		HIPGTS−4H,6H		HIPPS−4H,6H		HIPCS−4H,6H	
Bolt hole type	HIP−□□□□	P.1181	HIPH−□□□□	P.1181	HIPX−□□□□	P.1181	HIPXT−□□□□	P.1181	HIPL−□□□□	P.1181	HIPGT−□□□□	P.1181	HIPP−□□□□	P.1181	HIPC−□□□□	P.1181
Heat Resistance	5		9		4				9				3		3	
Insulation Efficiency	5		2		6				7				9		8	
Flexure strength	5		3		10				6				—		—	
Compressive strength	5		3		10				8				6		5	
Charpy impact value	5		4		10				9				5		6	
Workability	5		5		3				5				9		9	
Cost benefit	5		8		3				2				10		9	
Destruction temperature (Note 1)	400℃		700℃		300℃				500℃				180℃		180℃	
Recommended temperature (Note 2)	**220℃Less**		**500℃Less**		**180℃Less**				**400℃Less**				**100℃Less**		**100℃Less**	

(Note 1)"Destruction temperature"indicates a point where carbonizing, rupture, melting starts. Be sure to use at a temperature below recommended temperature.
(Note 2)"Recommended temperature"indicates temperature at which no sudden quality drop occurs when it is used for a long term.

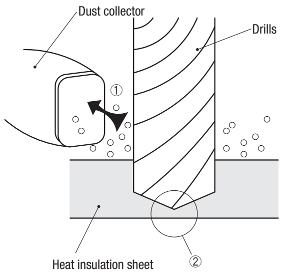
■Physical properties of the material

Material grades			Standard	Heat Proof	High Strength	High Temperature Proof※		Bakelite Paper	Bakelite Cloth
Items		Unit	HIP□	HIPH□	HIPX□	HIPL□	HIPG□	HIPP□	HIPC□
General characteristics	Specific gravity	—	2.0～2.2	2.0～2.2	1.8	1.95～2.05	2.0～2.1	1.4	1.4
	Water absorption	%	2～5	4～6	0.03	0.05～0.06	0.1	0.5～0.6	0.9～1.4
Electrical characteristics	※Volume resistivity	Ω-cm 4h/150℃	2.0×10^{14}	1.0×10^{12}	2.0×10^{15}	5.7×10^{16}	1.0×10^{15}	3.0×10^{9}	4.0×10^{8}
		100h/25℃/90%RH	3.0×10^{9}	1.0×10^{7}	1.0×10^{14}	8.2×10^{15}	1.0×10^{13}	9.0×10^{8}	5.0×10^{7}
	Flatwise breakage voltage	kV/mm	5～7	3	27	9～10	—	24～30	13～20
	Surface resistance	Ω	—	—	2.0×10^{15}	3.0×10^{16}	—	5.0×10^{10}	9.0×10^{8}
Mechanical property	Flexure strength	(SI unit)MPa	98～147	44～54	400～500	147	120～130	—	—
		kgf/cm²	1000～1500	450～550	4000～5000	1400～1500	1200～1300	—	—
	Compressive strength	(SI unit)MPa	147～294	117～147	500～580	440～461	420～480	294～392	245～294
		kgf/cm²	1500～3000	1200～1500	5000～5800	4500～4700	4200～4800	3000～4000	2500～3000
	Charpy impact value	(SI unit)J/cm²	1.4～1.5	1.0～1.1	9～10	6.0	2.5	1.88	2.10
		kgf・cm/cm²	14～15	10～11	90～100	61.7	25.5	18.9	21.2
Thermal characteristics	Expansion coefficient	l/℃	6.6×10^{-6}	9.0×10^{-6}	1.6×10^{-4}	2.6×10^{-5}	2.3×10^{-5}	1.6×10^{-4}	0.6×10^{-4}
	Thermal conductivity coefficient	(SI unit)W/m・K	0.71	1.21	0.59	0.24	0.3	0.21	0.38
		cal/cm・sec・℃	1.7×10^{-3}	2.9×10^{-3}	1.4×10^{-3}	0.58×10^{-3}	0.7×10^{-3}	0.5×10^{-3}	0.9×10^{-3}
		kcal/h・m・℃	0.61	1.04	0.50	0.21	0.26	0.18	0.32
	Specified heat	(SI unit)J/g・K	1.08	0.92	1.15	0.99	0.90	1.60	1.30
		cal/g・℃	0.26	0.22	0.28	0.24	0.22	0.38	0.31
Arc resistance		sec	180	240	180	345	—	—	—
Principal components	Main binder	—	Inorganic material (Borate type binder)	Inorganic material (Phosphate type binder)	Organic material (Super heat proof epoxy resin)	Inorganic material (Silicate binder)	Inorganic material (Silicate binder)	Organic material (Phenol-resin)	Organic material (Phenol-resin)
	Base material	—	Glass fiber	Glass fiber	Glass fiber	Glass fiber	Glass fiber	Craft paper	Cotton cloth

Note: Shown are examples of measurement values and are not guaranteed values.
※ Volume resistivity: top row values are measured after 4h/150℃, bottom row values under room temperature after 100h/25℃/90%RH
※ Upon use, make sure to check the temperature characteristics of mechanical strength (see the charts on **P.1323**)
※ High temperature proof sheets include two products made by different manufacturers.

■Method and Notes for machining Insulation sheet

① When machining, be sure to suck up dust into a dust collector so that it may not scatter.
Safety measures for usual works in dust, such as masks and goggles, are required as the insulation sheets contain glass fiber which may affect the skin such as itching.
When dust attaches to the machine, its accuracy may diminish.
② Drilling holes in the insulation sheet may cause cracks. Attention needs to be taken to hole pitches, diameters, and etc.
③ These insulation sheets are lamination-formed products, and not suitable for tapping and 3-dimensional machining.



●Machining Conditions

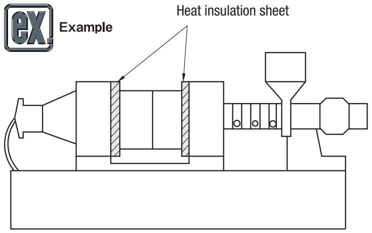
	machined or cylindrical	Milling	Drilling
Tools	Carbide (K−10)	Carbide (K−10)	Carbide (K−10)
Cutting speed V (m/min)	Blade: Large～Small 45～200	Blade: Large～Small 100～300	Blade: Large～Small 120～350
Revolution (rpm)	Blade: Large～Small 50～1000	Blade: Large～Small 300～1000	ϕ2 gimlet 1000～1500 ϕ5 gimlet 500～1000
Cutting depth (mm)	0.5～0.3	0.5～2.0	—
Feed (mm/revolution)	0.1～0.2	0.1～0.2	0.1～0.5

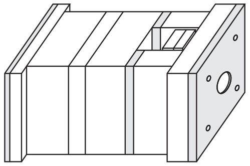
The above values are for reference only.

■Note on handling

① The insulation sheet may break when the bolt is tightened too hard.
② Do not use in areas where water, chemical or any liquids may come in. Insulation sheets that has absorbed water can be easily cracked, and cause significant degradation in their performance by increasing temperature.
③ When using the insulation sheets (Heat proof) at 300℃or more, there may be some smoke or odor at first, but does not affect the product quality.
④ Refer to P.1323 for property charts (durability data) on insulation sheets

Example





Standard grade

HEAT INSULATION SHEET

For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181

Non JIS material definition is listed on P.1351 - 1352

RoHS

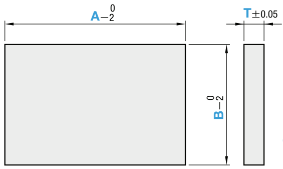
Type	Dimension selection type	Dimension designation type	4-hole type	6-hole type
Standard grade	HIP	HIPS	HIPS−4H	HIPS−6H

■Principal components

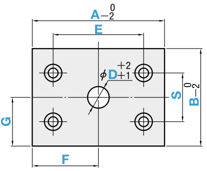
Main binder	Base material
Inorganic material (Borate type binder)	Glass fiber

Guide・Features P.1165
Durability data P.1331

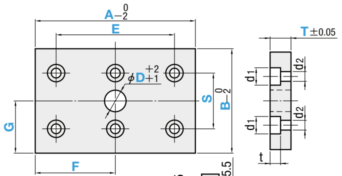
—Dimension selection・dimension designation type—
HIP・HIPS (A,B=20~)



—4-hole type—
HIPS−4H (A,B=45~)



—6-hole type—
HIPS−6H (A,B=45~)

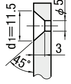


■Table for bolt size (Bolts P.1185)

T	d_1	d_2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5−12.



The E and S bolt hole positions are located symmetrically about the center.

■Dimension selection type

Part Number Type	A	B	Selection T
HIP	300	300	3 5 10 15
	400	300 400	
	500	300	
	600	400 500	
	700	400 500	
	800	500	

■Dimension designation type

Part Number Type	1mm increments A	1mm increments B	Selection T
HIPS	20~ 50	20~ 50	3 5 10 15
	51~100	20~100	
	101~150	20~150	
	151~200	20~200	
	201~250	20~250	
	251~300	20~300	
	301~350	20~350	
	351~400	20~400	
	401~450	20~450	
	451~500	20~500	
	501~550	20~550	
	551~600	20~600	
	601~650		
	651~700		
	701~750		
	751~800		

■Bolt hole type

Part Number Type	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPS−4H —6-hole type— HIPS−6H	45~ 50	45~ 50	5 10 15	*0 20 25	—4-hole type— $d_1+8\leqq E\leqq A-(d_1+8)$ $d_1+8\leqq S\leqq B-(d_1+8)$ —6-hole type— $2\times d_1+16\leqq E\leqq A-(d_1+8)$ $D+4<E$ $d_1+16\leqq S\leqq B-(d_1+8)$ $D+d_1+4<S$ When HK code is used, dimension d_1 ····▸ d.	$D/2+8\leqq F\leqq A-(D/2+8)$ $D/2+8\leqq G\leqq B-(D/2+8)$ When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51~100	45~100				
	101~150	45~150		*0 20 25 32		
	151~200	45~200		*0 20 25 32 45 50 60 100		
	201~250	45~250				
	251~300	45~300		*0 20 25 32 45 50 60 100 110 120		
	301~350	45~350				
	351~400	45~400				
	401~450	45~450				
	451~500	45~500		*0 20 25 32 45 50 60 100 110 120 150		
	501~550	45~550				
	551~600	45~600				
	601~650					
	651~700					
	701~750					
	751~800					

*0 ····▸ We will not add holes for ϕD.

Order

Part Number	A	B	T	D	E	S	F	G
HIP	400	400	10					
HIPS	A235	B 85	T10					
HIPS−4H	A420	B350	T10	D60	E360.0	S300.0	F200	G170

Note that minimum 8mm distance is required between the bolt holes.

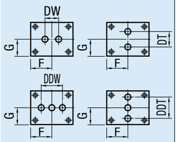
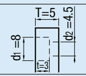
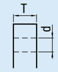
Days to Ship Quotation

Price Quotation

Alterations

Part Number	A	B	T	D	E	S	F	G	(DW···etc.)
HIPS−4H	A420	B350	T10	D60	E360.0	S300.0			DW120

Available for bolt hole type

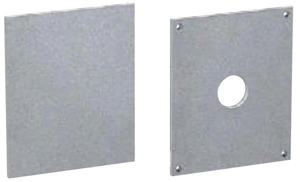
Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW・DT: Adds two D holes DDW・DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments $D+8\leqq DW\leqq A-(D+16)$ $(D\times2)+16\leqq DDW\leqq A-(D+16)$ $D+8\leqq DT\leqq B-(D+16)$ $(D\times2)+16\leqq DDT\leqq B-(D+16)$	Quotation
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1187) $d_1=8$, $d_2=4.5$, $t=3$	
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter HK 5: d 5.5, Applicable bolt dia M5 HK 6: d 6.5, Applicable bolt dia M6 HK 8: d 9, Applicable bolt dia M8	

Heat proof grade

HEAT INSULATION SHEET

For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181

Non JIS material definition is listed on P.1351 - 1352



RoHS

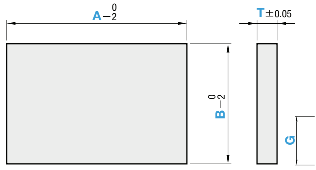
Type	Dimension selection type	Dimension designation type	4-hole type	6-hole type
Heat proof grade	HIPH	HIPHS	HIPHS—4H	HIPHS—6H

■Principal components

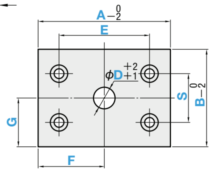
Main binder	Base material
Inorganic material (Phosphate type binder)	Glass fiber

Guide・Features P.1165
Durability data P.1331

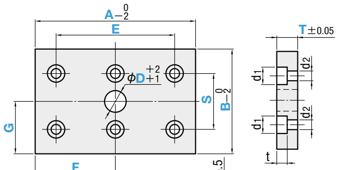
—Dimension selection・dimension designation type—
HIPH・HIPHS (A,B=20~)



—4-hole type—
HIPHS—4H (A,B=45~)



—6-hole type—
HIPHS—6H (A,B=45~)

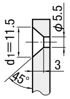


■Table for bolt size (Bolts P.1185)

T	d_1	d_2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5—12.



The E and S bolt hole positions are located symmetrically about the center.

■Dimension selection type

Part Number Type	A	B	Selection T
HIPH	300	300	3 5 10 15
	400	300 400	
	500	300 400	
	600	400 500	
	700	400 500	
	800	500	

■Dimension designation type

Part Number Type	1mm increments A	1mm increments B	Selection T
HIPHS	20~ 50	20~ 50	3 5 10 15
	51~100	20~100	
	101~150	20~150	
	151~200	20~200	
	201~250	20~250	
	251~300	20~300	
	301~350	20~350	
	351~400	20~400	
	401~450	20~450	
	451~500	20~500	
	501~550	20~550	
	551~600	20~600	
	601~650		
	651~700		
	701~750		
	751~800		

■Bolt hole type

Part Number Type	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPHS—4H —6-hole type— HIPHS—6H	45~ 50	45~ 50	5 10 15	*0 20 25	—4-hole type— $d_1+8 \leqq E \leqq A-(d_1+8)$ $d_1+8 \leqq S \leqq B-(d_1+8)$ —6-hole type— $2 \times d_1+16 \leqq E \leqq A-(d_1+8)$ $D+4<E$ $d_1+16 \leqq S \leqq B-(d_1+8)$ $D+d_1+4<S$ When HK code is used, dimension d1···▸ d.	$D/2+8 \leqq F \leqq A-(D/2+8)$ $D/2+8 \leqq G \leqq B-(D/2+8)$ When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51~100	45~100				
	101~150	45~150		*0 20 25 32		
	151~200	45~200		*0 20 25 32 45 50 60 100		
	201~250	45~250				
	251~300	45~300		*0 20 25 32 45 50 60 100 110 120		
	301~350	45~350				
	351~400	45~400				
	401~450	45~450				
	451~500	45~500		*0 20 25 32 45 50 60 100 110 120 150		
	501~550	45~550				
	551~600	45~600				
	601~650					
	651~700					
	701~750					
	751~800					

*0···▸We will not add holes for φD.

Order

Part Number	A	B	T	D	E	S	F	G
HIPH	400	400	10					
HIPHS	A235	B 85	T10					
HIPHS—4H	A420	B350	T10	D60	E360.0	S300.0	F200	G170

Note that minimum 8mm distance is required between the bolt holes.

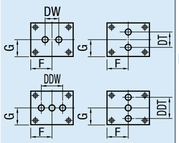
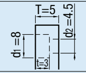
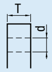
Days to Ship **Quotation**

Price **Quotation**

Alterations

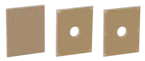
Part Number	A	B	T	D	E	S	F	G	(DW···etc.)
HIPHS—4H	A420	B350	T10	D60	E360.0	S300.0			DW120

Available for bolt hole type

Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW・DT: Adds two D holes DDW・DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments $D+8 \leqq DW \leqq A-(D+16)$ $(D \times 2)+16 \leqq DDW \leqq A-(D+16)$ $D+8 \leqq DT \leqq B-(D+16)$ $(D \times 2)+16 \leqq DDT \leqq B-(D+16)$	Quotation
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1187) d1=8, d2=4.5, t=3	
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter HK 5: d 5.5, M5 HK 6: d 6.5, M6 HK 8: d 9, M8	

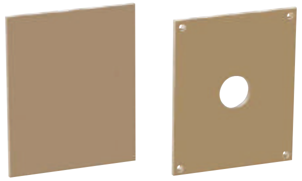
High strength grade

HEAT INSULATION SHEET



For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181

Thickness high precision±0.01 type P.1175



RoHS

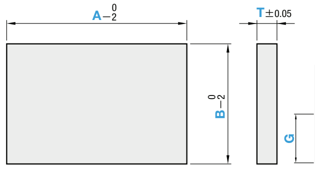
Type	Dimension selection type	Dimension designation type	4-hole type	6-hole type
High strength grade	HIPX	HIPXS	HIPXS−4H	HIPXS−6H

■Principal components

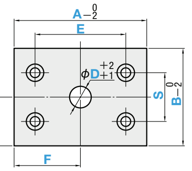
Main binder	Base material
Organic material (Super heat proof epoxy resin)	Glass fiber

Guide・Features P.1165
Durability data P.1331

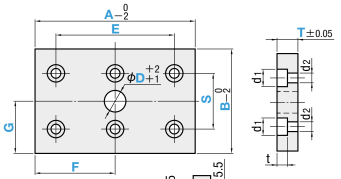
—Dimension selection・dimension designation type—
HIPX・HIPXS (A,B=20∼)



—4-hole type—
HIPXS−4H (A,B=45∼)



—6-hole type—
HIPXS−6H (A,B=45∼)

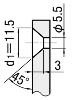


■Table for bolt size (Bolts P.1185)

T	d_1	d_2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5−12.



The E and S bolt hole positions are located symmetrically about the center.

■Dimension selection type

Part Number Type	A	B	Selection T
HIPX	300	300	3 5 10 15
	400	300 400	
	500	300 400	
	600	400 500	
	700	400 500	
	800	500	

■Dimension designation type

Part Number Type	1mm increments A	1mm increments B	Selection T
HIPXS	20∼ 50	20∼ 50	3 5 10 15
	51∼100	20∼100	
	101∼150	20∼150	
	151∼200	20∼200	
	201∼250	20∼250	
	251∼300	20∼300	
	301∼350	20∼350	
	351∼400	20∼400	
	401∼450	20∼450	
	451∼500	20∼500	
	501∼550	20∼550	
	551∼600	20∼600	
	601∼650		
	651∼700		
	701∼750		
	751∼800		

■Bolt hole type

Part Number Type	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPXS−4H —6-hole type— HIPXS−6H	45∼ 50	45∼ 50	5 10 15	*0 20 25	—4-hole type— $d_1+8 \leqq E \leqq A-(d_1+8)$ $d_1+8 \leqq S \leqq B-(d_1+8)$ —6-hole type— $2 \times d_1+16 \leqq E \leqq A-(d_1+8)$ $D+4<E$ $d_1+16 \leqq S \leqq B-(d_1+8)$ $D+d_1+4<S$ When HK code is used, dimension d1•••▸ d.	$D/2+8 \leqq F \leqq A-(D/2+8)$ $D/2+8 \leqq G \leqq B-(D/2+8)$ When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51∼100	45∼100				
	101∼150	45∼150		*0 20 25 32		
	151∼200	45∼200		*0 20 25 32 45 50 60 100		
	201∼250	45∼250				
	251∼300	45∼300		*0 20 25 32 45 50 60 100 110 120		
	301∼350	45∼350				
	351∼400	45∼400				
	401∼450	45∼450				
	451∼500	45∼500		*0 20 25 32 45 50 60 100 110 120 150		
	501∼550	45∼550				
	551∼600	45∼600				
	601∼650					
	651∼700					
	701∼750					
	751∼800					

*0•••▸ We will not add holes for φD.

Order

Part Number	A	B	T	D	E	S	F	G
HIPX	400	400	10					
HIPXS	A235	B 85	T10					
HIPXS−4H	A420	B350	T10	D60	E360.0	S300.0		

Note that minimum 8mm distance is required between the bolt holes.

Days to Ship Quotation

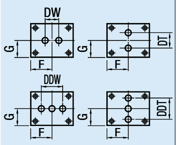
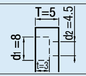
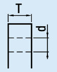
Non JIS material definition is listed on P.1351 - 1352

Price Quotation

Alterations

Part Number − A − B − T − D − E − S − F − G − (DW···etc.)
HIPXS−4H − A420 − B350 − T10 − D60 − E360.0 − S300.0 − DW120

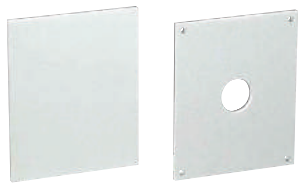
Available for bolt hole type

Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW・DT: Adds two D holes DDW・DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments $D+8 \leqq DW \leqq A-(D+16)$ $(D \times 2)+16 \leqq DDW \leqq A-(D+16)$ $D+8 \leqq DT \leqq B-(D+16)$ $(D \times 2)+16 \leqq DDT \leqq B-(D+16)$	Quotation
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1187) $d_1=8$, $d_2=4.5$, t=3	
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter HK 5, d 5.5, Applicable bolt dia M5 HK 6, d 6.5, Applicable bolt dia M6 HK 8, d 9, Applicable bolt dia M8	

High
temperature
proof grade

HEAT INSULATION SHEET

Thickness high precision±0.01 type P.1175



RoHS

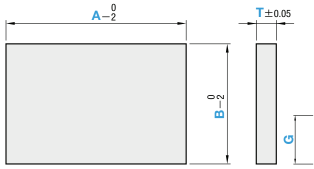
Type	Dimension designation type	4-hole type	6-hole type
High temperature proof grade	HIPLS	HIPLS−4H	HIPLS−6H

■Principal components

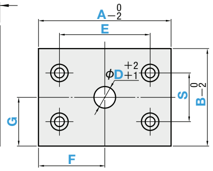
Main binder	Base material
Inorganic material (Silicate binder)	Glass fiber

Guide・Features P.1165
Durability data P.1331

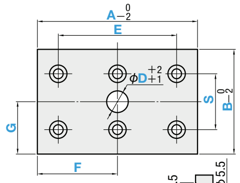
—Dimension designation type—
HIPLS (A,B=20~)

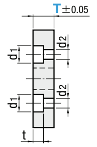


—4-hole type—
HIPLS−4H (A,B=45~)



—6-hole type—
HIPLS−6H (A,B=45~)



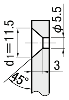


■Table for bolt size (Bolts P.1185)

T	d1	d2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5−12.



The E and S bolt hole positions are located symmetrically about the center.

■Dimension designation type

Part Number Type	1mm increments A	1mm increments B	Selection T
HIPLS	20~ 50	20~ 50	3 5 10 15
	51~100	20~100	
	101~150	20~150	
	151~200	20~200	
	201~250	20~250	
	251~300	20~300	
	301~350	20~350	
	351~400	20~400	
	401~450	20~450	
	451~500	20~500	
	501~550	20~550	
	551~600	20~600	
	601~650		
	651~700		
	701~750		
	751~800		

■Bolt hole type

Part Number Type	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPLS−4H —6-hole type— HIPLS−6H	45~ 50	45~ 50	5 10 15	*0 20 25	—4-hole type— $d_1+8\leqq E\leqq A-(d_1+8)$ $d_1+8\leqq S\leqq B-(d_1+8)$ —6-hole type— $2\times d_1+16\leqq E\leqq A-(d_1+8)$ $D+4<E$ $d_1+16\leqq S\leqq B-(d_1+8)$ $D+d_1+4<S$ When HK code is used, dimension d1•••▸ d.	$D/2+8\leqq F\leqq A-(D/2+8)$ $D/2+8\leqq G\leqq B-(D/2+8)$ When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51~100	45~100		*0 20 25 32		
	101~150	45~150		*0 20 25 32 45 50 60 100		
	151~200	45~200				
	201~250	45~250				
	251~300	45~300		*0 20 25 32 45 50 60 100 110 120		
	301~350	45~350				
	351~400	45~400				
	401~450	45~450				
	451~500	45~500		*0 20 25 32 45 50 60 100 110 120 150		
	501~550	45~550				
	551~600	45~600				
	601~650					
	651~700					
	701~750					
	751~800					

*0 •••▸ We will not add holes for φD.

Order

Part Number — A — B — T — D — E — S — F — G
HIPLS — A235 — B 85 — T10
HIPLS−4H — A420 — B350 — T10 — D60 — E360.0 — S300.0

Note that minimum 8mm distance is required between the bolt holes.

Days to Ship Quotation

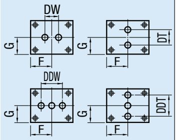
For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181

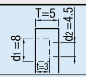
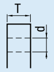
Non JIS material definition is listed on P.1351 - 1352

Alterations

Part Number — A — B — T — D — E — S — F — G — (DW・DDW・ZC・HK)
HIPLS−4H — A420 — B350 — T10 — D60 — E360.0 — S300.0 — DW120

Available for bolt hole type

Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW・DT: Adds two D holes DDW・DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments $D+8\leqq DW\leqq A-(D+16)$ $(D\times 2)+16\leqq DDW\leqq A-(D+16)$ $D+8\leqq DT\leqq B-(D+16)$ $(D\times 2)+16\leqq DDT\leqq B-(D+16)$	Quotation

Alterations	Code	Spec.	1Code
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1187) d1=8, d2=4.5, t=3	Quotation
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter HK / d / Applicable bolt dia: 5 / 5.5 / M5 6 / 6.5 / M6 8 / 9 / M8	

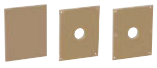
Price Quotation

High Strength Grade

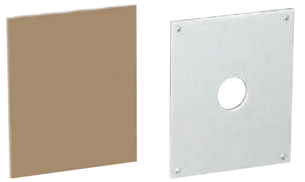
High temperature proof grade

HEAT INSULATION SHEET

— THICKNESS HIGH PRECISION —



For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181



RoHS

Type	T	Dimension designation type	4-hole type	6-hole type
High strength grade	T±0.01	HIPXTS	HIPXTS—4H	HIPXTS—6H
High temperature proof grade		HIPGTS	HIPGTS—4H	HIPGTS—6H

■Principal components

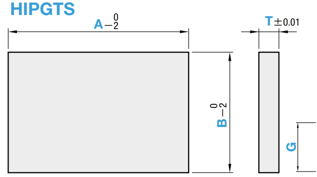
Type	Main binder	Base material
High strength grade	Organic material (Super heat proof epoxy resin)	Glass fiber
※High temperature proof grade	Inorganic material (Silicate binder)	

※Name of material product: Miolex PGX—595

Guide・Features P.1165
Durability data P.1331
(HIPXTS Type)

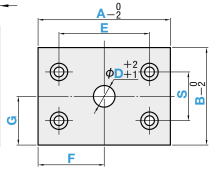
—Dimension designation type—

HIPXTS (A,B=20～)
HIPGTS



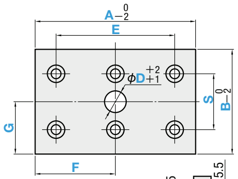
—4-hole type—

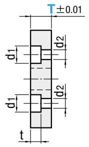
HIPXTS—4H (A,B=45～)
HIPGTS—4H



—6-hole type—

HIPXTS—6H (A,B=45～)
HIPGTS—6H



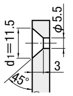


■Table for bolt size (Bolts P.1185)

T	d_1	d_2	t	Bolts (recommended)
10	11	6.5	7	CB6

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5—12.



The E and S bolt hole positions are located symmetrically about the center.

■Dimension designation type

Part Number Type	1mm increments A	1mm increments B	Selection T
HIPXTS HIPGTS	20～ 50	20～ 50	5 10
	51～100	20～100	
	101～150	20～150	
	151～200	20～200	
	201～250	20～250	
	251～300	20～300	
	301～350	20～350	
	351～400	20～400	
	401～450	20～450	
	451～500	20～500	

■Bolt hole type

Part Number Type	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPXTS—4H HIPGTS—4H —6-hole type— HIPXTS—6H HIPGTS—6H	45～ 50	45～ 50	5 10	*0 20 25	—4-hole type— $d_1+8 \leqq E \leqq A-(d_1+8)$ $d_1+8 \leqq S \leqq B-(d_1+8)$ —6-hole type— $2 \times d_1+16 \leqq E \leqq A-(d_1+8)$ $D+4<E$ $d_1+16 \leqq S \leqq B-(d_1+8)$ $D+d_1+4<S$ When HK code is used, dimension d_1 ••••▸ d.	$D/2+8 \leqq F \leqq A-(D/2+8)$ $D/2+8 \leqq G \leqq B-(D/2+8)$ When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51～100	45～100				
	101～150	45～150		*0 20 25 32		
	151～200	45～200		*0 20 25 32 45 50 60 100		
	201～250	45～250				
	251～300	45～300		*0 20 25 32 45 50 60 100 110 120		
	301～350	45～350				
	351～400	45～400				
	401～450	45～450				
	451～500	45～500		*0 20 25 32 45 50 60 100 110 120 150		

*0 ••••▸ We will not add holes for ϕD.

Order

Part Number	A	B	T	D	E	S	F	G
HIPXTS	A235	B 85	T10					
HIPGTS—4H	A420	B350	T10	D60	E360.0	S300.0	F200	G170

Note that minimum 8mm distance is required between the bolt holes.

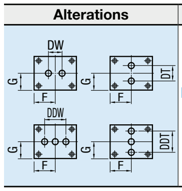
Days to Ship Quotation

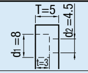
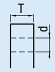
Non JIS material definition is listed on P.1351 - 1352

Alterations

Part Number — A — B — T — D — E — S — F — G — (DW・DDW・ZC・HK)
HIPXTS—4H — A400 — B350 — T10 — D60 — E360.0 — S300.0 — DW120

Available for bolt hole type

Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW・DT: Adds two D holes DDW・DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments $D+8 \leqq DW \leqq A-(D+16)$ $(D \times 2)+16 \leqq DDW \leqq A-(D+16)$ $D+8 \leqq DT \leqq B-(D+16)$ $(D \times 2)+16 \leqq DDT \leqq B-(D+16)$	Quotation

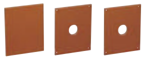
Alterations	Code	Spec.	1Code
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1187) $d_1=8$, $d_2=4.5$, t=3	Quotation
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter	

HK	d	Applicable bolt dia
5	5.5	M5
6	6.5	M6
8	9	M8

Price Quotation

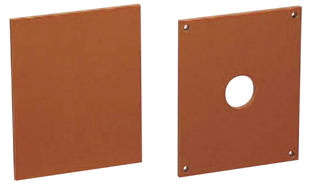
Bakelite-JIS
PL-PEM-Grade

HEAT INSULATION SHEET



For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181

Non JIS material definition is listed on P.1351 - 1352



RoHS

Type	Dimension selection type	Dimension designation type	4-hole type	6-hole type
Bakelite-JIS PL-PEM-Grade	HIPP	HIPPS	HIPPS—4H	HIPPS—6H

Principal components

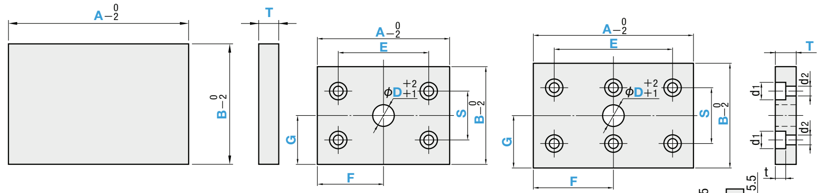
Main binder	Base material
Organic material (Phenol-resin)	Craft paper

Guide • Features P.1165
Durability data P.1331

—Dimension selection • dimension designation type— **HIPP • HIPPS** (A,B=20~)

—4-hole type— **HIPPS—4H** (A,B=45~)

—6-hole type— **HIPPS—6H** (A,B=45~)



T

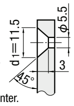
T	3	5	10	15
T	±0.2	±0.3	±0.45	±0.55

Table for bolt size (Bolts P.1185)

T	d1	d2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5—12.



The E and S bolt hole positions are located symmetrically about the center.

Dimension selection type

Part Number Type	A	B	Selection T
HIPP	300	300	3 5 10 15
	400	300 400	
	500	300 400	
	600	400 500	
	700	400 500	
	800	500	

Dimension designation type

Part Number Type	1mm increments A	1mm increments B	Selection T
HIPPS	20~ 50	20~ 50	3 5 10 15
	51~100	20~100	
	101~150	20~150	
	151~200	20~200	
	201~250	20~250	
	251~300	20~300	
	301~350	20~350	
	351~400	20~400	
	401~450	20~450	
	451~500	20~500	
	501~550	20~550	
	551~600	20~600	
	601~650		
	651~700		
	701~750		
	751~800		

Bolt hole type

Part Number Type	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPPS—4H —6-hole type— HIPPS—6H	45~ 50	45~ 50	5 10 15	*0 20 25	—4-hole type— d1+8≦E≦A−(d1+8) d1+8≦S≦B−(d1+8) —6-hole type— 2×d1+16≦E≦A−(d1+8) D+4<E d1+16≦S≦B−(d1+8) D+d1+4<S When HK code is used, dimension d1 ···▸ d.	D/2+8≦F≦A−(D/2+8) D/2+8≦G≦B−(D/2+8) When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51~100	45~100				
	101~150	45~150		*0 20 25 32		
	151~200	45~200		*0 20 25 32 45 50 60 100		
	201~250	45~250				
	251~300	45~300		*0 20 25 32 45 50 60 100 110 120		
	301~350	45~350				
	351~400	45~400				
	401~450	45~450				
	451~500	45~500		*0 20 25 32 45 50 60 100 110 120 150		
	501~550	45~550				
	551~600	45~600				
	601~650					
	651~700					
	701~750					
	751~800					

*0 ···▸ We will not add holes for φD.

Order

Part Number	A	B	T	D	E	S	F	G
HIPP	400	400	10					
HIPPS	A235	B 85	T10					
HIPPS—4H	A420	B350	T10	D60	E360.0	S300.0		

Note that minimum 8mm distance is required between the bolt holes.

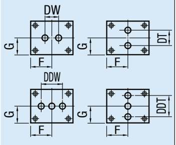
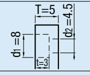
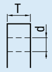
Days to Ship Quotation

Price Quotation

Alterations

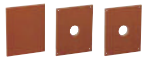
Part Number	A	B	T	D	E	S	F	G	(DW···etc.)
HIPPS—4H	A420	B350	T10	D60	E360.0	S300.0			DW120

Available for bolt hole type

Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW • DT: Adds two D holes DDW • DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments D+8≦DW≦A−(D+16) (D×2)+16≦DDW≦A−(D+16) D+8≦DT≦B−(D+16) (D×2)+16≦DDT≦B−(D+16)	Quotation
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1185) d1=8, d2=4.5, t=3	
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter HK / d / Applicable bolt dia 5 / 5.5 / M5 6 / 6.5 / M6 8 / 9 / M8	

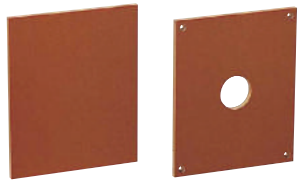
Bakelite-JIS
PL-FLE-Grade

HEAT INSULATION SHEET



For extra bolt hole processing other than 4-/6-bolt hole type, refer to P.1181

Non JIS material definition is listed on P.1351 - 1352



RoHS

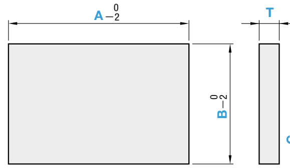
Type	Dimension selection type	Dimension designation type	4-hole type	6-hole type
Bakelite-JIS PL-FLE-Grade	HIPC	HIPCS	HIPCS−4H	HIPCS−6H

Principal components

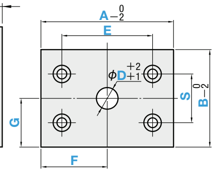
Main binder	Base material
Organic material (Phenol-resin)	Cotton cloth

Guide・Features P.1165
Durability data P.1331

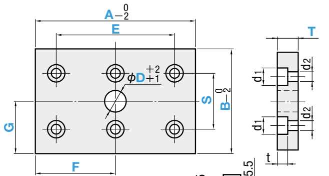
—Dimension selection・dimension designation type—
HIPC・HIPCS (A,B=20∼)



—4-hole type—
HIPCS−4H (A,B=45∼)



—6-hole type—
HIPCS−6H (A,B=45∼)



T dimension tolerance

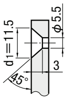
T	3	5	10	15
T	±0.3	±0.4	±0.65	±0.8

Table for bolt size (Bolts P.1185)

T	d1	d2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

When there is no F or G specification
F=A/2
G=B/2

When T=5
Hole addition for flat head bolt M5.
We recommend using FB5−12.



The E and S bolt hole positions are located symmetrically about the center.

Dimension selection type

Part Number Type	A	B	Selection T
HIPC	300	300	3 5 10 15
	400	300 400	
	500	300 400 500	
	600		
	700	400 500	
	800	500	

Dimension designation type

Part Number Type	1mm increments A	B	Selection T
HIPCS	20∼ 50	20∼ 50	3 5 10 15
	51∼100	20∼100	
	101∼150	20∼150	
	151∼200	20∼200	
	201∼250	20∼250	
	251∼300	20∼300	
	301∼350	20∼350	
	351∼400	20∼400	
	401∼450	20∼450	
	451∼500	20∼500	
	501∼550	20∼550	
	551∼600	20∼600	
	601∼650		
	651∼700		
	701∼750		
	751∼800		

Bolt hole type

Part Number Type	1mm increments A	B	Selection T	D	0.5mm increments E・S	1mm increments F・G
—4-hole type— HIPCS−4H —6-hole type— HIPCS−6H	45∼ 50	45∼ 50	5 10 15	*0 20 25	—4-hole type— d1+8≦E≦A−(d1+8) d1+8≦S≦B−(d1+8) —6-hole type— 2×d1+16≦E≦A−(d1+8) D+4<E d1+16≦S≦B−(d1+8) D+d1+4<S When HK code is used, dimension d1···▸ d.	D/2+8≦F≦A−(D/2+8) D/2+8≦G≦B−(D/2+8) When there is no F or G specification F=A/2 and G=B/2 In the case of D0, a specification is unnecessary.
	51∼100	45∼100				
	101∼150	45∼150		*0 20 25 32		
	151∼200	45∼200		*0 20 25 32 45 50 60 100		
	201∼250	45∼250				
	251∼300	45∼300		*0 20 25 32 45 50 60 100 110 120		
	301∼350	45∼350				
	351∼400	45∼400				
	401∼450	45∼450				
	451∼500	45∼500				
	501∼550	45∼550				
	551∼600	45∼600		*0 20 25 32 45 50 60 100 110 120 150		
	601∼650					
	651∼700					
	701∼750					
	751∼800					

*0 ···▸ We will not add holes for ϕD.

Order

Part Number	A	B	T	D	E	S	F	G
HIPC	400	400	10					
HIPCS	A235	B 85	T10					
HIPCS−4H	A420	B350	T10	D60	E360.0	S300.0		

Note that minimum 8mm distance is required between the bolt holes.

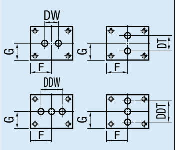
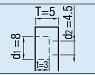
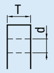
Days to Ship Quotation

Price Quotation

Alterations

Part Number − A − B − T − D − E − S − F − G − (DW···etc.)
HIPCS−4H − A420 − B350 − T10 − D60 − E360.0 − S300.0 − DW120

Available for bolt hole type

Alterations	Code	Spec.	1Code
	DW DDW DT DDT	DW・DT: Adds two D holes DDW・DDT: Adds three D holes DW, DDW, DT, DDT holes are located symmetrically about the center from points F and G. DW DDW DT DDT=1mm increments D+8≦DW≦A−(D+16) (D×2)+16≦DDW≦A−(D+16) D+8≦DT≦B−(D+16) (D×2)+16≦DDT≦B−(D+16)	Quotation
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1185) d1=8, d2=4.5, t=3	
	HK	Changes from counterbores to drill holes (through). Select the bolt diameter	

HK	d	Applicable bolt dia
5	5.5	M5
6	6.5	M6
8	9	M8

HEAT INSULATION SHEETS BOLT HOLE TYPE

Non JIS material definition is listed on P.1351 - 1352

RoHS

(When 1D4HT)

Type	Part Number	Plate size A · B	T dimension tolerance 5	10	15
High strength grade	HIPXT—	A45~500 B45~500	±0.01		—
High temperature proof grade	※HIPGT—				
Standard grade	HIP—	A45~800 B45~600	±0.05		
Heat proof grade	HIPH—				
High strength grade	HIPX—				
High temperature proof grade	※HIPL—				
Bakelite (JIS PL-PEM) Grade	HIPP—		±0.4	±0.65	±0.8
Bakelite (JIS PL-FLE) Grade	HIPC—				

※HIPGT-Name of material product:Miolex PGX-595
※HIPL-Name of material product:Lossna-Board

Guide・Features P.1165
Durability data P.1331 (HIP—,HIPH—,HIPX—,HIPL—)

(When 3D4HU)

(When 5DB6HN)

Part Number				Plate size			STEP1	STEP2	STEP3	
							Holes for ejector rods	Bolt holes for insulation sheet fixation	Bolt holes for mold installation	
Type	STEP1	STEP2	STEP3	1mm increments A	1mm increments B	Selection T	D	0.5mm increments E · S	Q	1mm increments X · Y
*HIPXT— *HIPGT— (T±0.01 Type) HIP— HIPH— HIPX— HIPL— HIPP— HIPC—	0D 1D *2D *2DA *3D *3DA *4DA *4DB *5DA *5DB	0H (No hole) 4H (4 Bolt holes) 6H (6 Bolt holes)	T (Through hole) U (U groove) N (No hole)	45~ 50	45~ 50	5 10 *15	20 25	Note that minimum 8mm distance is required between the bolt holes.	11 14 16 18 20 22 24	Note that minimum 8mm distance is required between the bolt holes.
				51~100	45~100					
				101~150	45~150		20 25 32			
				151~200	45~200		20 25 32 45 50 60 100			
				201~250	45~250					
				251~300	45~300		20 25 32 45 50 60 100 110 120	4H When $d_1+8 \leqq E \leqq A-(d_1+8)$ $d_1+8 \leqq S \leqq B-(d_1+8)$		$\sqrt{\left(\frac{E-X}{2}\right)^2+\left(\frac{S-Y}{2}\right)^2} \geqq \frac{Q}{2}+\frac{d_1}{2}+8$
				301~350	45~350					
				351~400	45~400					4H · 6H When only and $Q+8 \leqq X \leqq A-(Q+8)$ $Q+8 \leqq Y \leqq B-(Q+8)$
				401~450	45~450					
				451~500	45~500		20 25 32 45 50 60 100 110 120 150	6H When $2\times d_1+16 \leqq E \leqq A-(d_1+8)$ $d_1+16 \leqq S \leqq B-(d_1+8)$		When U groove type $A-Q\times 3 \leqq X \leqq A-Q$ $Q+8 \leqq Y \leqq B-(Q+8)$
				501~550	45~550					
				551~600	45~600		Designation needless for 0D. Only 1D applicable to D100 or more.			
				601~650						
				651~700						
				701~750						
				751~800						

Dimensions of A, B, and D are restricted in order to ensure the strength for ★ marked in STEP1. (Refer to the table in the drawing) HIPXT— and HIPGT— are A≦500, B≦500 and T≦10

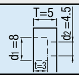
Order

Part Number	—	A	—	B	—	T	—	D	—	E	—	S	—	Q	—	X	—	Y
HIP—1D4HT	—	A420	—	B350	—	T10	—	D25	—	E360.0	—	S300.0	—	Q14	—	X330	—	Y270

Days to Ship Quotation

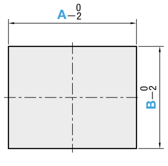
Alterations

Part Number	—	A	—	B	—	T	—	D	—	E	—	S	—	Q	—	X	—	Y	—	(ZC)
HIP—1D4HT	—	A420	—	B350	—	T5	—	D25	—	E360.0	—	S300.0	—	Q14	—	X330	—	Y270	—	ZC

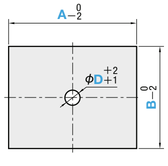
Alteration	Code	Spec.	1Code
	ZC	Changes the holes from M5 countersunk (T=5) to counterbore for M4 low head cap screw. (P.1187) d1=8, d2=4.5, t=3	Quotation

STEP1: Hole machining for ejector rods against JIS (Hole pitch is fixed.)

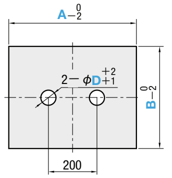
0D



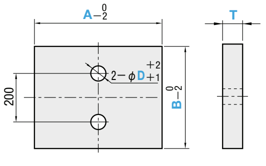
1D



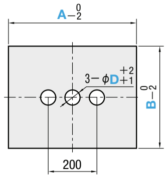
*2D



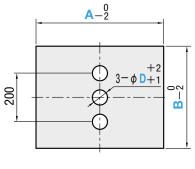
*2DA



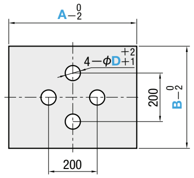
*3D



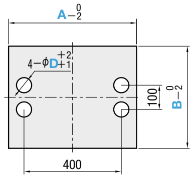
*3DA



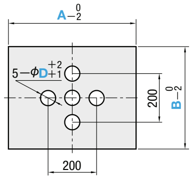
*4DA



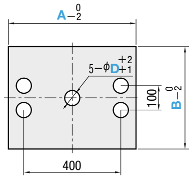
*4DB



*5DA



*5DB



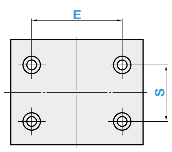
Dimensions of A, B and D are restricted for ＊ marked specifications.

	Amin.	Bmin.	Dmax.
0D · 1D	Dimension Table	Dimension Table	Dimension Table
2D · 3D	A≧D+216	B≧D+16	D≦60
2DA · 3DA	A≧D+16	B≧D+216	D≦60
4DA · 5DA	A≧D+216	B≧D+216	D≦60
4DB · 5DB	A≧D+416	B≧D+116	D≦60

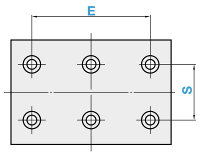
※To ensure strength, hole cannot be set on 4mm or less departing from each edge.

STEP2: Bolt hole machining for fixing insulation sheets

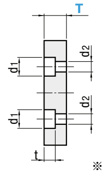
4H



6H



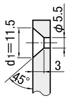
When bolt holes are not necessary, specify 0H



■Table for bolt size (Bolts P.1185)

T	d_1	d_2	t	Bolts (recommended)
10	11	6.5	7	CB6
15	14	9	9	CB8

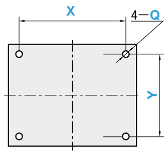
When T=5
Hole addition for flat head bolt M5.
We recommend using FB5—12.



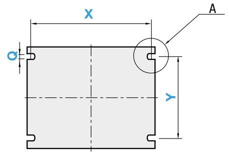
※To ensure strength, hole cannot be set on 4mm or less departing from each edge.

STEP3: Bolt hole machining for mold installation

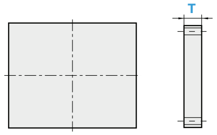
T
(Through hole type)



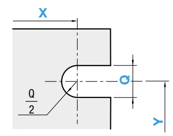
U
(U groove type)



N
(No hole)



Details of part A



※To ensure strength, hole cannot be set on 4mm or less departing from each edge.

BOLTS / SCREWS / WASHERS

BOLTS SCREWS WASHERS				
Product Name Part Number	Socket Head Cap Screws CB	Small Head Cap Screws CBHS	Low Head Cap Screws CBS CBSS	Socket Head Cap Screws—Through Hole Type— CBA
Page	1185	1186	1187 1187	1188

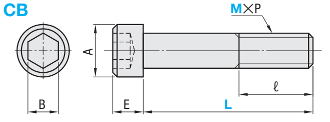
Spring Washers CBW	Socket Head Cap Screws—Flat head— FB FBJ	Bolts for Ejector Plate Set EPB	Precision Shoulder Bolts—L Dimension Designation— MSBL	Shoulder Bolts—Bushing Type— CSR
1188	1189 1189	1190	1191	1191

Shoulder Bolts MSB	Screw Plugs—Through · Washer · JIS · Long · Tapered Type— MSW MSWS MSWA MSWAS MSWZ MSWZS MSWJ MSWC MSWT MSWTS	Washers · Spacers MSRB LRB T R K W SRW SPW SPWG STR SW SSWA USR SBW
1192	1193 1194	1195 · 1196

Free Washers MWSC MWFB MWZC MWSCN MWFBN MWZCN	Urethane Washers UW	Washers (Riser Pads) For Heat Insulation RPSK RPSB RPST RPSZ	Free Washers for Heat Insulation MWSCS MWFBS MWZCS
1197 1197	1198	1199	1200 1200 1200

SOCKET HEAD CAP SCREWS

RoHS **CB**



Details of dimensions and strength ranks **Right page**

M SCM435 (M3∼M20)
SCM440 (M24)
H 38∼43HRC (M3∼M20)
32∼37HRC (M24)
Screw part : Class 2 JIS B 0205

S Black Oxide (Fe_3O_4)

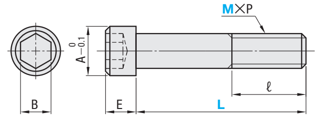
(Bolt precision JIS B 1176
Strength rank 12.9 (M3∼M20)
10.9 (M24))

ℓ	Part Number Type M− L	U/Price	Slide 1 Quantity	Slide 2 Quantity
Full Thread	CB 3−5			
	6			
	8			
	10			
	12			
	14			
	15			
	16			
	18			
	20			
	22			
18	25			
	30			
	35			
	40			
	45			
	50			
	55			
	60			
	65			
Full Thread	CB 4−5			
	6			
	8			
	10			
	12			
	14			
	15			
	16			
	18			
	20			
	22			
	25	Quotation		
20	30			
	35			
	40			
	45			
	50			
	55			
	60			
	65			
	70			
	75			
Full Thread	CB 5−5			
	6			
	8			
	10			
	12			
	14			
	15			
	16			
	18			
	20			
	22			
	25			
22	30			
	35			
	40			
	45			
	50			
	55			
	60			
	65			
	70			
22	CB 5−75			
	80			
	85			
	90			
	95			
	100			
	110			
	120			
	130			
	140			
Full Thread	CB 6−6			
	8			
	10			
	12			
	14			
	15			
	16			
	18			
	20			
	22			
	25			
	30			
24	35			
	40			
	45			
	50			
	55			
	60			
	65			
	70			
	75			
	80	Quotation		
	85			
	90			
	95			
	100			
	110			
	120			
	130			
	140			
	150			
Full Thread	CB 8−8			
	10			
	12			
	15			
	16			
	18			
	20			
	22			
	25			
	30			
	35			
28	40			
	45			
	50			
	55			
	60			
	65			
	70			
	75			
	80			
	85			
	90			
28	CB 8−95			
	100			
	110			
	120			
	130			
	140			
	150			
	160			
	200			
Full Thread	CB 10−10			
	12			
	15			
	20			
	25			
	30			
	35			
	40			
32	45			
	50			
	55			
	60			
	65			
	70			
	75			
	80			
	85			
	90			
	95			
	100			
	110			
	120			
	130			
	140			
	150			
	160			
	170			
	180			
	190			
	200	Quotation		
	210			
Full Thread	CB 12−15			
	20			
	25			
	30			
	35			
	40			
	45			
	50			
36	55			
	60			
	65			
	70			
	75			
	80			
	85			
	90			
	95			
	100			
	110			
	120			
	130			
	140			
	150			
	160			
	170			
	180			
	190			
	200			
	210			
	220			
	230			
	240			
	250			
	260			
	270			
	280			
	290			
Full Thread	CB 16−20			
	25			
	30			
	35			
	40			
	45			
	50			
	55			
	60			
44	65			
	70			
	75			
	80			
	85			
	90			
	95			
	100			
	110			
	120			
	130			
	140			
	150			
	160			
	170			
	180			
	190			
	200			
	210			
	220			
	230			
	240			
	250			
	260			
	270			
	280			
	290			
	300			
	310			
	320	Quotation		
Full Thread	CB 20−40			
	45			
	50			
	55			
	60			
	65			
	70			
	75			
52	80			
	85			
	90			
	95			
	100			
	110			
	120			
	130			
	140			
	150			
	160			
	170			
	180			
	190			
	200			
	210			
	220			
	230			
	240			
	250			
Full Thread	CB 24−50			
	60			
	70			
	80			
60	90			
	100			
	110			
	120			
	130			
	140			
	150			

SMALL HEAD CAP SCREWS

Non JIS material definition is listed on P.1351 - 1352

RoHS **CBHS**



CBHS is made by grinding down the head of CB, part of the stamped characters on the head surface may sometimes remain visible.

M SCM435
H 38∼43HRC
Screw part : Class 2 JIS B 0205

S Black Oxide (Fe_3O_4)

(Bolt precision JIS B 1176
Strength rank 12.9)

ℓ	Part Number Type M−L	U/Price 1∼19	Slide Unit Price 20∼100
Full Thread	CBHS 3−5		
	6		
	8		
	10		
	12		
	15		
	20		
18	25	Quotation	
Full Thread	CBHS 4−5		
	6		
	8		
	10		
	12		
	15		
	20		
	25		
20	30		
	35		
Full Thread	CBHS 5−8		
	10		
	12		
	15		
	20	Quotation	
	25		
22	30		
	35		
	40		
	45		
Full Thread	CBHS 6−10		
	12		
	15		
	20	Quotation	
	25		
	30		
24	35		
	40		
	45		
	50		
Full Thread	CBHS 8−15		
	20		
	25		
	30	Quotation	
	35		
28	40		
	45		
	50		
	55		
	60		

To be quoted on price & lead time above Max. Q'ty.

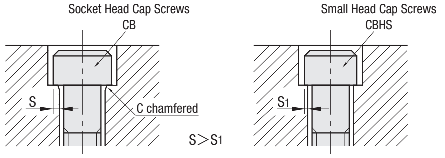
Order

Part Number
CB 8−40
CBHS5−10

P **Price** Quotation

Days to Ship Quotation

The bolt tightening part S_1 of CBHS is smaller than the bolt tightening part S of CB, and also the tightening force is weaker than that of CB. If you wish to obtain an adequate tightening force, consider adding more bolts. It is also recommended that you reduce the size of the counterbore machining. (See figure at right.) If you remove an excessive amount of the C-chamfering, the bolt head may become recessed below the mounting part.



■Details Size and Strength Rank of Socket Head Cap Screw

M×P (coarse thread)	A		E	B
	CB	CBHS		
M 3×0.5	5.5	4.5	3	2.5
M 4×0.7	7	5.5	4	3
M 5×0.8	8.5	7	5	4
M 6×1.0	10	8.5	6	5
M 8×1.25	13	11	8	6
M10×1.5	16	—	10	8
M12×1.75	18	—	12	10
M16×2.0	24	—	16	14
M20×2.5	30	—	20	17
M24×3.0	36	—	24	19

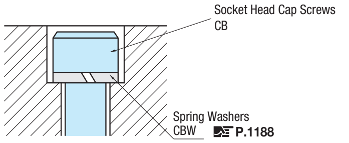
※"Strength rank" signifies tensile strength of bolts.

(Example) 12.9 (CB3∼20)
- Indicates that the yield point or the minimum proof strength is 90% of the tensile strength.
- Indicates that the minimum tensile strength is 1220N/mm^2{124kgf/mm^2}

10.9 (CB24)
- Indicates that the yield point or the minimum proof strength is 90% of the tensile strength.
- Indicates that the minimum tensile strength is 980N/mm^2{100kgf/mm^2}

[Technical Data]
- Screw lower hole table **P.1347**

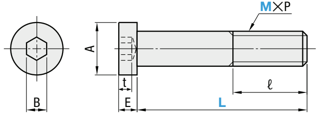
Example



LOW HEAD CAP SCREWS／EXTRA LOW HEAD CAP SCREWS

RoHS

CBS (Low head cap screw)

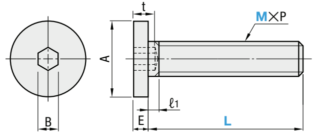


M S45C (M3 8・M12)
SCM435 (M10)
H 22～32HRC
S Black Oxide (Fe_3O_4)
(strength rank 10.9)

M×P (Coarse thread)	A	E	B	t max.	ℓ	Part Number Type	Part Number M−L	U/Price 1～99
M3×0.5	5.5	2	2	1.5	Full Thread	CBS	3−6	Quotation
							8	
							10	
							12	
							16	
					12		20	
M4×0.7	7	2.8	2.5	2.3	Full Thread	CBS	4−6	
							8	
							10	
							12	
							16	
							20	
							25	
M5×0.8	8.5	3.5	3	2.7	Full Thread	CBS	5−8	
							10	
							12	
							16	
							20	
							25	
					16		30	
M6×1.0	10	4	4	3	Full Thread	CBS	6−8	
							10	
							12	
							16	
							20	
							25	
					18		30	
							35	
							40	
							45	
M8×1.25	13	5	5	3.8	Full Thread	CBS	8−10	
							12	
							16	
							20	
							25	
							30	
					22		35	
							40	
							45	
							50	
M10×1.5	16	6	6	4.5	Full Thread	CBS	10−16	
							20	
							25	
							30	
							35	
							40	
							45	
					32		50	
M12×1.75	18	7	8	5	Full Thread	CBS	12−20	
							25	
							30	
							35	
							40	
							45	
					30		50	

RoHS

CBSS (Extra low head cap screw)



M SCM435
H 32～39HRC
S Black Oxide (Fe_3O_4)

M×P (Coarse thread)	A	E	B	t max.	ℓ1 max.	Part Number Type	Part Number M−L	U/Price 1～99
M3×0.5	6	1.3	1.5	2	1.6	CBSS	3−6	Quotation
							8	
							10	
M4×0.7	8	1.5	2	2.5	1.6	CBSS	4−6	
							8	
							10	
M5×0.8	9	1.5	3	3	1.6	CBSS	5−8	
							10	
							12	
							16	
							20	
M6×1.0	10	1.5	3	4	2.0	CBSS	6−8	
							10	
							12	
							16	
							20	
							25	
M8×1.25	13	1.5	4	5	2.5	CBSS	8−8	
							10	
							12	
							16	
							20	
							25	
							30	
M10×1.5	16	1.5	5	5	3.0	CBSS	10−10	
							12	
							16	
							20	
							25	
							30	

※"Strength rank" signifies tensile strength of bolts.

(Example) 10.9
└Indicates that the yield point or the minimum proof strength is 90% of the tensile strength.
└Indicates that the minimum tensile strength is 980N/mm²{100kgf/mm²}

☎ Order — Part Number
CBS 4−10
CBSS5−12

Days to Ship — **Quotation**

P Price — **Quotation**

■**Features**

- ● **LOW HEAD CAP SCREWS**
  - It can be used in the places where conventional hex socket cap screws head makes an obstruction.
- ● **EXTRA LOW HEAD CAP SCREWS**
  - Developed to minimize the space required for the screw head size.
  - Requires no countersinking unlike flat-head screws.

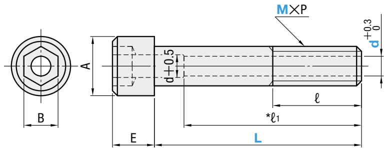
SOCKET HEAD CAP SCREWS／SPRING WASHERS

—THROUGH HOLE TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

CBA



*M 6～ 8 L≧40 ···· ℓ1=30
M10～16 L≧60 ···· ℓ1=50

M SCM435
Bolt precision JIS B 1176
Screw part Class 2 JIS B 0205 6g (Class 2)

H 38～43HRC
S Black Oxide (Fe_3O_4)

M×P (Coarse thread)	A	E	B	ℓ New JIS	Part Number Type	Part Number M−L−d	U/Price 1～49	Slide Unit Price 50～200
M5×0.8	8.5	5	4	Full Thread	CBA	5−10−2	Quotation	
						20−2		
				22		30−2		
M6×1.0	10	6	5	Full Thread	CBA	6−10−3		
						20−3		
						30−3		
				24		40−3		
						50−3		
						60−3		
						70−3		
						80−3		
M8×1.25	13	8	6	Full Thread	CBA	8−20−4		
				28		30−4		
						40−4		
						50−4		
						60−4		
						70−4		
						80−4		
						90−4		
						100−4		
M10×1.5	16	10	8	Full Thread	CBA	10−20−5		
						30−5		
						40−5		
				32		50−5		
						60−5		
						70−5		
						80−5		
						90−5		

To be quoted on price & lead time above Max. Q'ty.

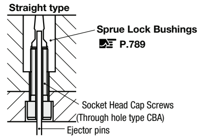
M×P (Coarse thread)	A	E	B	ℓ New JIS	Part Number Type	Part Number M−L−d	U/Price 1～49	Slide Unit Price 50～200
M12×1.75	18	12	10	Full Thread	CBA	12−30−6		Quotation
						30−7		
						40−6		
				36		50−6		
						60−6		
						70−6		
						80−6		
						90−6		
						90−7		
						100−6		
						100−7		
M16×2.0	24	16	14	Full Thread	CBA	16−50−9		
				44		60−9		
						70−9		
						80−9		
						90−9		
						100−9		

To be quoted on price & lead time above Max. Q'ty.

☎ Order — Part Number
CBA5−10−2

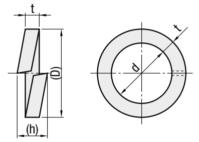
Days to Ship — **Quotation**

ex. The through hole size matches the diameter of the corresponding ejector pins.



RoHS

CBW (Spring washers)



(D): Maximum (h) : Minimum

M SWRH H 42～50HRC

d	(D)	(h)	t	Part Number Type	Part Number No.	U/Price 1～199	Slide Unit Price 200～499	Slide Unit Price 500～1000
3.1	5.6	2.0	1	CBW	3		Quotation	
4.1	7	2.4	1.2		4			
5.1	8.8	3.2	1.6		5			
6.1	9.9	3.2	1.6		6			
8.1	12.7	4	2		8			
10.2	16	5	2.5		10			
12.2	18	5	2.5		12			
16.2	24.4	7	3.5		16			
20.2	30.6	9	4.5		20			
24.5	35.9	10	5		24			

To be quoted on price & lead time above Max. Q'ty.

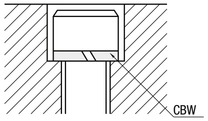
☎ Order — Part Number
CBW10

Days to Ship — **Quotation**

Reference : Counterbore and bolt hole sizes for socket head cap screws P.1345

ex. Example

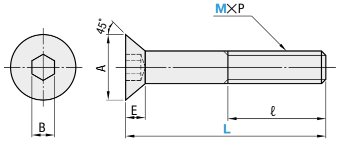
Can be used without enlarging the bolt head counterbore.



SOCKET HEAD CAP SCREWS

RoHS

FB (Conventional type)
FBJ (JIS type)



M SCM435 (Class 2 JIS B 0205
H 32～38HRC (Strength rank 10.9)
S Black Oxide

■Conventional Type (E dimension space saving standard)

M×P (Coarse thread)	A min.	A max.	E min.	E max.	B	ℓ	Part Number Type M−L	U/Price 1～99	Slide Unit Price 100～
M4×0.7	7.64	8.00	2.16	2.30	2.5	Full Thread	FB 4−10	Quotation	
							15		
							20		
							25		
						14	30		
							35		
M5×0.8	9.64	10.00	2.66	2.80	3.0	Full Thread	FB 5−10		
							12		
							15		
							16		
							20		
							25		
							30		
						16	35		
							40		
M6×1.0	11.57	12.00	3.12	3.30	4.0	Full Thread	FB 6−10		
							12		
							15		
							16		
							20		
							25		
							30		
							35		
							40		
						18	45		
M8×1.25	15.57	16.00	4.22	4.40	5.0	Full Thread	FB 8−15		
							20		
							25		
							30		
							35		
							40		
						22	45		
							50		
M10×1.5	19.48	20.00	5.32	5.50	6.0	Full Thread	FB 10−20		

To be quoted on price & lead time above Max. Q'ty.

■JIS Type

M×P (Coarse thread)	A min.	A max.	E min.	E max.	B	ℓ	Part Number Type M−L	U/Price 1～99	Slide Unit Price 100～
M4×0.7	7.53	8.96	2.23	2.48	2.5	Full Thread	FBJ 4−10	Quotation	
							15		
							20		
							25		
						20	30		
							35		
M5×0.8	9.43	11.20	2.80	3.10	3.0	Full Thread	FBJ 5−10		
							12		
							15		
							16		
							20		
							25		
							30		
						22	35		
							40		
M6×1.0	11.34	13.44	3.30	3.72	4.0	Full Thread	FBJ 6−10		
							12		
							15		
							16		
							20		
							25		
							30		
							35		
						24	40		
							45		
M8×1.25	15.24	17.92	4.40	4.96	5.0	Full Thread	FBJ 8−15		
							20		
							25		
							30		
							35		
							40		
							45		
						28	50		
M10×1.5	19.22	22.40	5.50	6.20	6.0	Full Thread	FBJ 10−20		

To be quoted on price & lead time above Max. Q'ty.

- FB is compliant with SSS (Socket Screw Society of Japan) standards. (Previously, there was no JIS standard for Socket Head Cap Screws and this organization established its own standard.)
- The E dimension is shorter than the JIS standard.

- FBJ is compliant with JIS standard JIS B 1194 (2000). (First standardized by JIS in 2000)
- JIS displays only the max. value for the E dimension.

Order Part Number
FB5−10

Days to Ship Quotation

※"Strength rank" signifies tensile strength of bolts.

(Example) 10.9
- Indicates that the yield point or the minimum proof strength is 90% of the tensile strength.
- Indicates that the minimum tensile strength is 980N/mm^2{100kgf/mm^2}

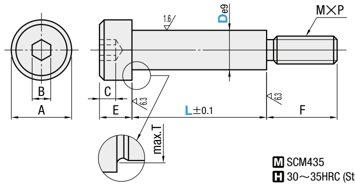
[Technical Data]
・Screw lower hole table P.1355

BOLTS FOR EJECTOR PLATE SET

Non JIS material definition is listed on P.1351 - 1352

RoHS

EPB



M SCM435
H 30～35HRC (Strength rank 10.9)
S Black Oxide (Only the head)

De9		A	B	C	E	F	M×P	T
10	−0.025 −0.061	16	6	4	8	16	M 8×1.25	10.8
13	−0.032 −0.075	18	8	5	10	20	M10×1.5	14
16		24	10	7	14	24	M12×1.75	17
20	−0.040 −0.092	27	14	9	18	32	M16×2.0	21
25		33	17	11	19	40	M20×2.5	26

Part Number Type	D	L	U/Price 1～19	Slide Unit Price 20～49
EPB	10	31 36 41 46 51 56 61	Quotation	
	13	31 36 41 46 51 56 61 66 71		
	16	51 56 61 66 71 76 81 91 101 111 121 131		
	20	61 66 71 76 81 91 101 111 121 131 141		
	25	121 131 141 151 161		

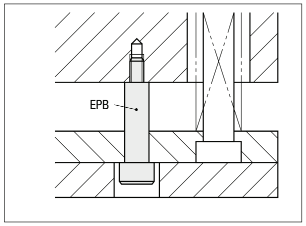
No knurling on the head.

To be quoted on price & lead time above Max. Q'ty.

Order Part Number − L
EPB10 − 51

Days to Ship Quotation

Example
- Use when pushing up and fixing the ejector plate such as when setting or replacing the ejector pin.
- The L dimension is a 5mm unit+1mm to conform to the 5mm step space. Consequently, it is possible to install the die on the molding machine without creating a counterbore on the top of the ejector plate.
- The threaded part (F dimension) is long, enabling the ejector plate to be set easily without being subjected to the spring load.



■ Size F comparison table

D	M×P	F EPB	F Shoulder Bolt MSB・MSBL (P.1191～1192)
10	M 8×1.25	16	12
13	M10×1.5	20	16
16	M12×1.75	24	18
20	M16×2.0	32	24
25	M20×2.5	40	30

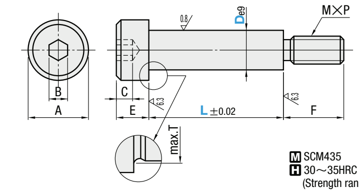
PRECISION SHOULDER BOLTS／SHOULDER BOLTS−BUSHING TYPE−

—L DIMENSION DESIGNATION TYPE—

SHOULDER BOLTS

Non JIS material definition is listed on P.1351 - 1352

RoHS **MSBL**



M SCM435
H 30～35HRC
(Strength rank 10.9)

S Black Oxide (Only the head)

De9		A	B	C	E	F	M×P	T
6.5	−0.025 −0.061	10	4	2.5	5	9	5×0.8	7
8		13	5	3	6	9	6×1.0	8.7
10		16	6	4	8	12	8×1.25	10.8
13	−0.032 −0.075	18	8	5	10	16	10×1.5	14
16		24	10	7	14	18	12×1.75	17
20	−0.040 −0.092	27	14	9	18	24	16×2.0	21
25		33	17	11	19	30	20×2.5	26

Part Number		1mm increments	U/Price	Slide Unit Price
Type	D	L	1～19	20～49
MSBL	6.5	10～ 70	Quotation	
	8	10～ 90		
	10	10～120		
	13	10～130		
	16	15～150		
	20	15～150		
	25	30～160		

No knurling on the head.

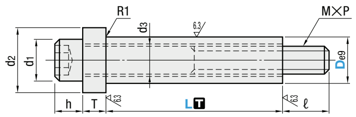
Order Part Number — L
MSBL10 — 53

Example Right page

Days to Ship Quotation

Price Quotation

RoHS **CSR**



	L T
L≦100	L±0.03
L≧110	L±0.05

De9		d1	d2	d3	M×P	h	T	ℓ
10	−0.025 −0.061	10	15	6.3	M 6×1.0	6	5	10
13	−0.032 −0.075	13	18	8.4	M 8×1.25	8	5	15
16		16	24	10.6	M10×1.5	10	8	22
20	−0.040 −0.092	18	28	12.6	M12×1.75	12	10	20
25		24	36	16.8	M16×2.0	16	13	27
32	−0.050 −0.112	30	45	20.8	M20×2.5	20	16	34

① M SCM435
Strength rank 12.9

② M S45C
H 38～43HRC
S Black Oxide (Fe_3O_4)

Part Number		L	U/Price
Type	D		1～19
CSR	10	10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100	Quotation
	13	15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120	
	16	20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180	
	20	30 35 40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180	
	25	40 45 50 55 60 65 70 75 80 85 90 100 110 120 130 140 150 160 170 180 200	
	32	60 70 80 90 100 110 120 130 140 150 160 170 180 200	

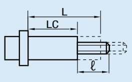
Order Part Number — L
CSR20 — 60

Days to Ship Quotation

Price Quotation

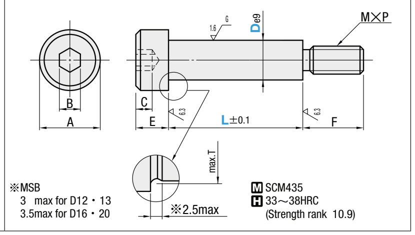
Alterations Part Number — L(LC)
CSR20 — LC57.0

Quotation

Alteration	Code	Spec.	1Code
	LC	Retainer's dimension L alteration(＝②) LCmin.≦LC＜Lmax. L±0.03 0.1mm increments Set the bolt according to measurements ℓ by the following table.	Quotation

D	10	13	16	20	25	32
LCmin.	10.1	10.0	10.0	25.0	30.0	55.0
ℓ	10～14.9	15～24.9	22～29.9	20～29.9	27～36.9	34～43.9

RoHS **MSB**



※MSB
3 max for D12・13
3.5max for D16・20

M SCM435
H 33～38HRC
(Strength rank 10.9)

De9		A	B	C	E	F	M×P	T
4	−0.020 −0.050	6.5	2.5	1.6	3	5	M 2.5×0.45	4.5
4.5		7				6	M 3 ×0.5	5
5		8			3.5			5.5
5.5		9	3	2.2	4	7	M 4 ×0.7	6
6				2				6.5
6.5	−0.025 −0.061	10	4	2.5	5	9	M 5 ×0.8	7
8		13	5	3	6		M 6 ×1.0	8.7
10		16	6	4	8	12	M 8 ×1.25	10.8
12	−0.032 −0.075	17						12.8
13		18	8	5	10	16	M10 ×1.5	14
16		24	10	7	14	18	M12 ×1.75	17
20	−0.040 −0.092	27	14	9	18	24	M16 ×2.0	21

Part Number		L	U/Price
Type	D		1～19
MSB	4	15 20 25 30 35 40 10 45	Quotation
	4.5	15 20 25 30 35 40 10 45 50	
	5	15 20 25 30 35 40 10 45 50	
	5.5	15 20 25 30 35 40 10 45 50 55	
	6	15 20 25 30 35 40 10 45 50 55 60 65 70	
	6.5	15 20 25 30 35 40 10 45 50 55 60 65 70 75 80	
	8	15 20 25 30 35 40 45 10 50 55 60 65 70 75 80 85 90 95 100 110 120	
	10	15 20 25 30 35 40 45 50 55 60 65 70 75 10 80 85 90 95 100 110 120	
	12	15 20 25 30 35 40 45 50 55 60 65 70 75 10 80 85 90 95 100	
	13	15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 10 110 120 130	
	16	15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 110 120 130 140 150	
	20	40 50 60 70 80 90 100 110 120 130 140 150	

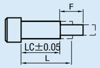
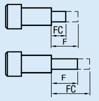
Order Part Number — L
MSB10 — 50

Days to Ship Quotation

Price Quotation

Alterations Part Number — L(LC) — (FC)
MSB10 — LC50.1 — FC10.5

Quotation

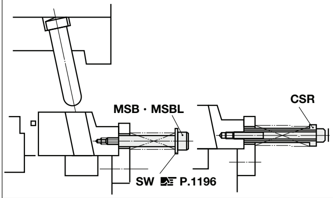
Alterations	Code	Spec.	1Code
	LC	Changes the length (L) LC tolerance ±0.05 L min.≦LC≦L max. 0.1mm increments Dimension F remains unchanged. Use FC alteration to change it.	Quotation
	FC	Changes the thread part length M≦FC≦M×3 0.5mm increments 3≦FC≦7.5 only when D＝4 Available only when LC is used.	

Spacers for MSB Shoulder Bolts (MSRB) P.1195

- For spring specifications P.1225
- For slide core stop block specifications P.659
- For angular pin specifications P.609
- For slide core specifications P.639

Example

Application for drawing back the slide core (used together with a spring)

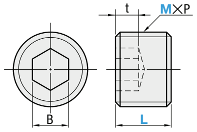


SCREW PLUGS

M2.5～M10 are Coarse thread, while M12～M45 (Pitch1.5) are fine thread.

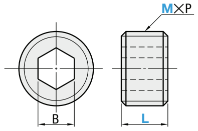
RoHS

MSW
MSWS (Short type)



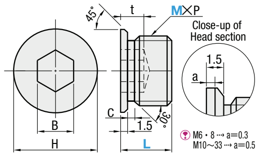
M **MSW** SCM435 (M2.5～10)
S45C (M12～45)
MSWS S45C
H 34～43HRC
S Black Oxide (Fe_3O_4)
(Class 2 JIS B 0207)

MSWA (Through hole type)
MSWAS (Through hole, short type)



M S45C
H 34～43HRC
S Black Oxide (Fe_3O_4)
(Class 2 JIS B 0205)

MSWZ (Seat type)
MSWZS (Seat type, short type)



M6・8 → a=0.3
M10～33 → a=0.5

M S45C
H 33～38HRC
S Black Oxide (Fe_3O_4)
(Class 2 JIS B 0205)

■Standard type

M×P		L	B	t	Part Number Type	Part Number M	U/Price 1～299	Slide Unit Price 300～500
2.5	0.45	3	1.3	1.2	MSW	2.5	Quotation	
3	0.5	3	1.5			3*		
4	0.7	4	2	1.5		4*		
5	0.8	5	2.5	2		5*		
6	1.0	6	3	3.5		6		
8	1.25	8	4	5		8		
10	1.5	10	5	6		10		
12	1.5 (Fine thread)		6	5		12		
14						14		
16			8			16		
18			10			18		
20		12		6		20		
22			12			22		
24			14			24		
25						25		
26						26		
27						27		
28						28		
30			17			30		
33						33		
36		18		10		36		
38						38		
40						40		
42						42		
45						45		

* The tips of MSW 3, 4 and 5 are the "cup points". (☞ **Right page**)

M×P		L	B	Part Number Type	Part Number M	U/Price 1～299	Slide Unit Price 300～499	Slide Unit Price 500～999	Slide Unit Price 1000～2000
8	1.25	8	4	MSWA (Through hole type)	8	Quotation			
10	1.5	10	5		10				
12	1.5 (Fine thread)		6		12				
14					14				
16			8		16				
18			10		18				
20		12			20				
22			12		22				
24			14		24				
25					25				
26					26				
27					27				
28					28				
30			17		30				
33					33				

M×P		L	B	H	t	C	Part Number Type	Part Number M	U/Price 1～99	Slide Unit Price 100～199	Slide Unit Price 200～299	Slide Unit Price 300～500
6	1.0	8	3	9	5	2.5	MSWZ (Washer type)	6	Quotation			
8	1.25	10	4	11				8				
10	1.5	12	5	13				10				
12	1.5 (Fine thread)		6	15				12				
14				17				14				
16			8	19				16				
18			10	21				18				
20		15		23				20				
22			12	25				22				
24			14	27				24				
25				28				25				
26				29				26				
27				30				27				
28				31				28				
30			17	33				30				
33				36				33				

■Short full length type

M×P		L	B	t	Part Number Type	Part Number M−L	U/Price 1～299	Slide Unit Price 300～499	Slide Unit Price 500～1000
8	1.25	6	4	3	MSWS (Short type)	8−6	Quotation		
10	1.5		5			10−6			
12	1.5 (Fine thread)		6			12−6			
14						14−6			
16			8			16−6			
18			10			18−6			
20		8		4		20−8			
22			12			22−8			
24			14			24−8			
25						25−8			
26						26−8			
27						27−8			
28						28−8			
30						30−8			
33			17			33−8			

M×P		L	B	Part Number Type	Part Number M−L	U/Price 1～299	Slide Unit Price 300～499	Slide Unit Price 500～999	Slide Unit Price 1000～2000
8	1.25	6	4	MSWAS (Through hole type, short)	8−6	Quotation			
10	1.5		5		10−6				
12	1.5 (Fine thread)		6		12−6				
14					14−6				
16			8		16−6				
18			10		18−6				
20		8			20−8				
22			12		22−8				
24			14		24−8				
25					25−8				
26					26−8				
27					27−8				
28					28−8				
30			17		30−8				
33					33−8				

M×P		L	B	H	t	C	Part Number Type	Part Number M−L	U/Price 1～99	Slide Unit Price 100～199	Slide Unit Price 200～299	Slide Unit Price 300～500
10	1.5	10	5	13	4	2.0	MSWZS (Washer type, short)	10−10	Quotation			
12	1.5 (Fine thread)		6	15				12−10				
14				17				14−10				
16			8	19				16−10				
18			10	21				18−10				
20				23				20−10				
22			12	25				22−10				
24			14	27				24−10				
25				28				25−10				
26				29				26−10				
27				30				27−10				
28				31				28−10				
30		12	17	33	5			30−12				
33				36				33−12				

Compared with the standard type **(MSW・MSWA・MSWZ)**, the short type screw plugs naturally have less threads. Before use, check the load that applies to the screw plug and the material of the plate to be tapped.

M12 and larger are fine thread type to retain the thread and to ensure strength.

Order

Part Number
MSW 18
MSWS18−6

ex ☞ Right page

Days to Ship **Quotation**

SCREW PLUGS

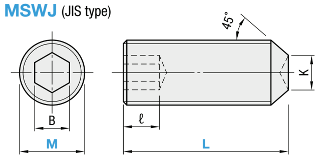
—JIS TYPE／LONG TYPE／TAPERED TYPE—

Non JIS material definition is listed on P.1351 - 1352

ℓ dimension is the minimum dimension. This may be longer depending on the lot.

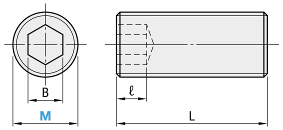
RoHS

MSWJ (JIS type)



M SCM435
S Black Oxide (Fe_3O_4)
H 32～42HRC

MSWC (Long type)



M S45C
S Black Oxide (Fe_3O_4)
H 32～42HRC

M×Pitch (Coarse thread type)	ℓ	K	B	Part Number Type	Part Number M	L	U/Price 1～99	Slide Unit Price 100～199
M 3×0.5	1.5	1.5	1.5	MSWJ (JIS type)	3	4	Quotation	
						5		
						6		
M 4×0.7	2	2	2		4	5		
						6		
						8		
M 5×0.8	2.5	2.5	2.5		5	6		
						8		
						10		
M 6×1.0	3	3	3		6	8		
						10		
						15		
M 8×1.25	4	5	4		8	10		
						12		
						15		
M10×1.5	4	6	5		10	12		
						15		
						20		
M12×1.75	5	8	6		12	15		
						20		
						25		

To be quoted on price & lead time above Max. Q'ty.

M×Pitch (Coarse thread type)	L	B	ℓ	Part Number Type	Part Number M	U/Price 1～49	Slide Unit Price 50～99
M 6×1.0	30	3	3	MSWC (Long type)	6	Quotation	
M 8×1.25		4	4		8		
M10×1.5		5	5		10		
M12×1.75		6	6		12		
M14×2.0					14		
M16×2.0		8	8		16		
M18×2.5					18		
M20×2.5	35	10	10		20		
M22×2.5		12			22		
M24×3.0			12		24		
M27×3.0		14	14		27		
M30×3.5		17	17		30		

To be quoted on price & lead time above Max. Q'ty.

Order

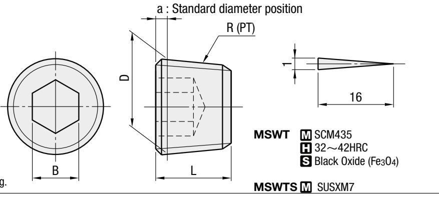
Part Number	—	L
MSWJ10	—	15

Days to Ship **Quotation**

RoHS

MSWT (Tapered type)
MSWTS (Stainless, tapered type)

Thread part : JIS B 0203
Tapered thread R (PT) for tubing
*However, the thread part of
MSWT No. S is ANSI B2.2.
tapered thread (NPT) for American tubing.



MSWT **M** SCM435
H 32～42HRC
S Black Oxide (Fe_3O_4)

MSWTS **M** SUSXM7

D	a	L	B	t	R(PT)	Part Number Type	Part Number No.	MSWT U/Price 1～14	MSWT Slide Unit Price 15～99	MSWTS U/Price 1～14	MSWTS Slide Unit Price 15～99
7.723	0.45	6	4	3.0	1/16	MSWT	*J	Quotation			
7.779	0.47	6.4	$4^{+0.03}_{-0.032}$	3.1			*S				
9.728	0.45	7	5	3.5	1/8	MSWT MSWTS (Stainless)	1				
13.157	0.7	8.9	6	4.5	1/4		2				
16.662	0.7	10	8	5	3/8		3				
20.955	0.9	12	10	6	1/2		4				
26.441		14	14	7	3/4		6				
33.249	1.1	16.5	17	9	1		8				

No. of threads per 25.4mm. * MSWT No. S is ANSI thread; Use a 5/32" hex wrench for mounting. MSWT No. J is JIS thread.

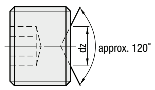
Order

Part Number
MSWT J
MSWT 4

Days to Ship **Quotation**

To be quoted on price & lead time above Max. Q'ty.

■MSW : Dimensions and shape of cup point



Part Number	dz max.
MSW3	1.4
MSW4	2.0
MSW5	2.5

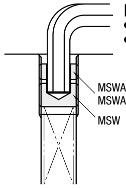
Note that the tips of MSW 3, 4 and 5 are the "cup points".

ex Example

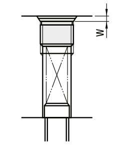
■MSW
- Adjustment of fixing position is easy.

■Through hole type
- It can be fixed in combination with MSW as a double nut.

■Short type
- Short L dimension enables use in small space.
- Plate material to process tap hole and load on screw plug are to be concerned because the amount of threading on the screw is small.



■(Countersunk type)
- Seat section gives loosening prevention effect.
- Chamfering depth W prevents over-tightening of the spring.

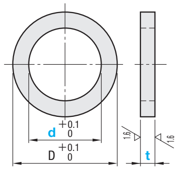


WASHERS／SPACERS

Non JIS material definition is listed on P.1351 - 1352

RoHS

MSRB


d +0.1 0
D +0.1 0
1.6
1.6
t

t **T**	
0.1	±0.020
0.2	±0.020
0.3	±0.030
0.5	±0.030
1.0	±0.040
2.0	±0.090

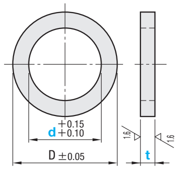
M SK5

D	d	Part Number		t	U/Price 1～49	Slide Unit Price 50～99
6.5	4	MSRB	4*	0.1 0.2 0.3 0.5 1.0 2.0	Quotation	
7	4.5		4.5			
8	5		5*			
9	5.5		5.5			
9	6		6*			
10	6.5		6.5			
13	8		8			
16	10		10			
17	12		12*			
18	13		13			
24	16		16			
27	20		20			

⊗ * t=2.0 is not available for d4/5/6/12.

RoHS

LRB


d +0.15 +0.10
D ±0.05
1.6
1.6
t

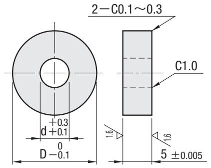
t **T**	
0.1	±0.020
0.2	±0.020
0.3	±0.030
0.5	±0.030
1.0	±0.040

M SK5

D	d	Part Number		t	U/Price 1～49	Slide Unit Price 50～99
6	4	LRB	4	0.1 0.2 0.3 0.5 1.0	Quotation	
7	5		5			
8	6		6			
10	8		8			
13	10		10			
16	13		13			
19	16		16			
23	20		20			

RoHS

T・R

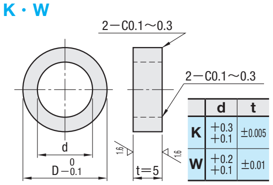

2－C0.1～0.3
C1.0
d +0.3 +0.1
D 0 −0.1
1.6
1.6
5 ±0.005

M S45C
H 48～52HRC

D	d	Part Number		U/Price 1～49	Slide Unit Price 50～199	200～499	500～1000
11.5	4	T	6.5	Quotation			
13	5		8				
15	6		10				
18	8		13				
21	10		16				
23	12		20				
16	4	R	6.5－16				
18			6.5－18				
18	5		8－18				
20			8－20				
22			8－22				
20	6		10－20				
22			10－22				
25			10－25				
27			10－27				
25	8		13－25				
27			13－27				
30			13－30				
30	10		16－30				
35			16－35				
40			16－40				
35	12		20－35				
40			20－40				

RoHS

K・W


2－C0.1～0.3
2－C0.1～0.3
d
D 0 −0.1
1.6
1.6
t=5

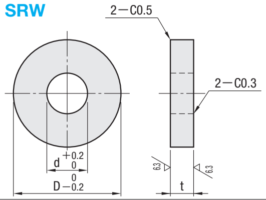
	d	t
K	+0.3 +0.1	±0.005
W	+0.2 +0.1	±0.01

M S45C
H 48～52HRC

D	d	Part Number		U/Price 1～49	Slide Unit Price 50～199	200～499	500～1000
10	6	K	10	Quotation			
13	8		13				
16	10		16				
20	12		20				
8	5	W	10				
11	6		13				
14	8		16				
17	10		20				

RoHS

SRW

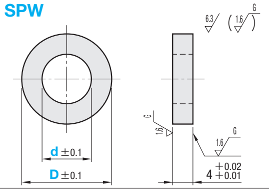

2－C0.5
2－C0.3
d +0.2 0
D 0 −0.2
6.3
6.3
t

M SS400

D	d	t	Part Number		U/Price 1～49	Slide Unit Price 50～199	200～499	500～1000
12	5.3	3	SRW	8	Quotation			
15				10				
19	6.4	4		13				
22				16				
26	8.4	5		20				
30				25				

RoHS

SPW


6.3
(1.6/)
G
d ±0.1
D ±0.1
1.6
4 +0.02 +0.01

M S45C

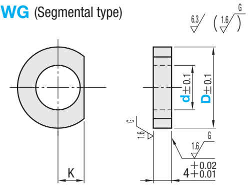
D	Part Number		d	U/Price 1～49	Slide Unit Price 50～199	200～499	500～1000
13	SPW	13	4.5	Quotation			
			5.5				
			6.5				
16		16	6.5				
			8.5				
20		20	8.5				
			10.5				
25		25	10.5				
			12.5				

Order
- MSRB・LRB Part Number — t
  MSRB10 — 0.1
- T・R・K・W SRW Part Number
  T10
  R16—30
- SPW Part Number — d
  SPW13 — 5.5

Days to Ship Quotation

RoHS

SPWG (Segmental type)

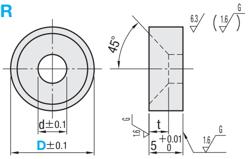

6.3
(1.6/)
G
d ±0.1
D ±0.1
K
1.6
4 +0.02 +0.01

M S45C

D	K	Part Number		d	U/Price 1～49	Slide Unit Price 50～199	200～499	500～1000
13	5	SPWG	13	5.5	Quotation			
				6.5				
16	6		16	8.5				
20	7		20	10.5				
25	8		25	12.5				

RoHS

STR

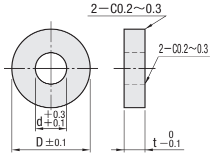

6.3
(1.6/)
G
45°
d ±0.1
D ±0.1
t
5 +0.01 0
1.6

M S45C
H 46～50HRC

D	d	t	Part Number		U/Price 1～49	Slide Unit Price 50～199	200～499	500～1000
16	5.5	3.0	STR	16	Quotation			
20	6.5	3.5		20				
25	8.5	4.5		25				

RoHS

SW

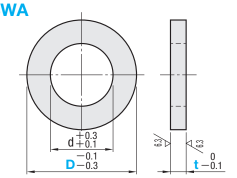

2－C0.2～0.3
2－C0.2～0.3
d +0.3 +0.1
D ±0.1
t 0 −0.1

M S45C
H 48～52HRC

D	d	t	Part Number		U/Price 1～19	Slide Unit Price 20～49	50～99	100～200
10	4.5	3	SW	10	Quotation			
12	5.5			12				
	6			12－6				
16	6.5	4		16				
20	8	5		20				
22	10			22				
25				25				
	12			25－12				
27	13	8		27				
30				30				
35	16			35				
40				40				
50	20	10		50				

RoHS

SSWA

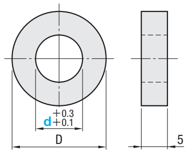

d +0.3 +0.1
D −0.1 −0.3
6.3
6.3
t 0 −0.1

M SS400

d	Applicable springs	Part Number Type	D	t	U/Price for 1～19 t=1.0	t=2.0	t=3.0	t=4.0	t=5.0
3.0	6	SSWA	5	1.0 2.0 3.0 4.0 5.0	Quotation				
5.0	8		7						
6.0	10		9						
7.0	12		11.5						
8.0	14		13						
9.0	16		15						
10.0	18		17						
12.0	20		19						
12.0	22		21						
14.5	25		24						
15.0	27		26						
17.0	30		29						
20.0	35		34						
23.0	40		39						

RoHS

USR

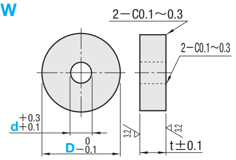


M S45C
H 20～25HRC

D	Part Number Type	d	U/Price 1～19	Slide Unit Price 20～49	50～99	100～200
22	USR	10	Quotation			
27		13				
32		16				
37		20				
44		25				
54		32				
64		38				
74		45				

RoHS

SBW


2－C0.1～0.3
2－C0.1～0.3
d +0.3 +0.1
D 0 −0.1
3.2
3.2
t±0.1

M S45C
H 48～52HRC

t	Part Number Type	D	d	U/Price 1～49	Slide Unit Price 50～199	200～500
5	SBW	20	5	Quotation		
		22	5			
		25	6			
7		27	5			
		30	6			
		35	8			

Order
- STR SW USR Part Number
  SW 22
  USR13
- SSWA Part Number — t
  SSWA24 — 3.0
- SPWG SBW Part Number — d
  SBW27 — 8

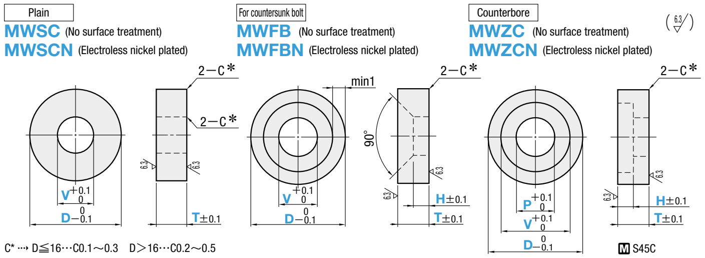
Days to Ship Quotation

Price Quotation

FREE WASHERS

—PLAIN／FOR COUNTERSUNK BOLT／COUNTERBORE—

RoHS



Plain
MWSC (No surface treatment)
MWSCN (Electroless nickel plated)
For countersunk bolt
MWFB (No surface treatment)
MWFBN (Electroless nickel plated)
Counterbore
MWZC (No surface treatment)
MWZCN (Electroless nickel plated)
(6.3)
2−C*
min1
90°
6.3
$V^{+0.1}_{0}$
$D^{0}_{-0.1}$
$P^{+0.1}_{0}$
T±0.1
H±0.1

C* ···→ D≦16···C0.1～0.3　D＞16···C0.2～0.5

M S45C

Part Number	D	T	V	P	H	MWSC	MWFB	MWZC	MWSCN	MWFBN	MWZCN
		0.1mm increments				U/Price 1～9					
Plain **MWSC** (No surface treatment) **MWSCN** (Electroless nickel plated) For countersunk bolt **MWFB** (No surface treatment) **MWFBN** (Electroless nickel plated) Counterbore (D≧10 T≧3.0) **MWZC** (No surface treatment) **MWZCN** (Electroless nickel plated)	5.0～10.0 (0.1mm increments)	1.0～ 5.0	Plain For countersunk bolt 3.0～70.0 Counterbore 5.0～70.0	Counterbore only 3.0～68.0	For countersunk bolt 0≦H＜T Counterbore 1.0≦H≦48.0	Quotation					
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									
	10.1～20.0 (0.1mm increments)	1.0～ 5.0									
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									
	20.5～30.0 (0.5mm increments)	1.0～ 5.0									
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									
	30.5～40.0 (0.5mm increments)	1.0～ 5.0									
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									
	40.5～60.0 (0.5mm increments)	1.0～ 5.0									
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									
	60.5～80.0 (0.5mm increments)	2.0～ 5.0									
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									
	80.5～100.0 (0.5mm increments)	2.0～ 5.0									
		5.1～10.0									
		10.1～20.0									
		20.1～30.0									
		30.1～40.0									
		40.1～50.0									

Plain

D＞50 ···→ T≧ 2: To make D size larger than 50mm, the thickness (T) must be T2 or more.

D−V≧2 ···→ The wall thickness must be 1mm or more on each side.

For countersunk bolt

D＞50 ···→ T≧2 : To make D size larger than 50mm, the thickness (T) must be T2 or more.

$\frac{D-V}{2}-(T-H)\geqq 1$ ···→ The wall thickness must be at least 1mm.

Counterbore

(D−V)/2≧1 ···→ The wall thickness (T) must be at least 1mm on each side.

(V−P)≧2 ···→ A step of 1mm or more is required on each side.

P×8≧(T−H)≧2 ···→ The bearing bore length (T-H) is between 2mm and P×8.

Order

Part Number		D		T		V		P		H
MWSC	—	D20.0	—	T6.0	—	V6.0				
MWFB	—	D20.0	—	T6.0	—	V6.0			—	H3.0
MWZC	—	D20.0	—	T6.0	—	V6.0	—	P4.0	—	H3.0

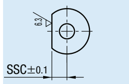
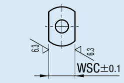
Quotation

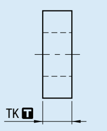
Alterations

Part Number — D — T — V — P — H — (SSC · WSC · TK)

MWFB — D30.0 — T3.0 — V10.0 — H1.0 — TK1

P Quotation

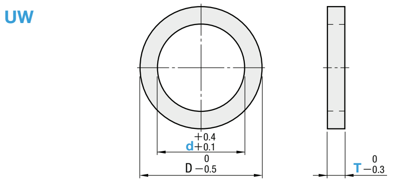
Alterations	Code	Spec.	1Code
	SSC	Cuts a face. SSC=1mm increments SSC≧V/2+2 SSC≦D/2−1 ⊗ Not available for D5～D8.	Quotation
	WSC	Cuts two faces. WSC=1mm increments WSC≧V+4 WSC≦D−2 ⊗ Not available for D5～D8.	

Alterations	Code	Spec.	1Code
	TK1	Changes T dimension tolerance. T±0.1 ···→ $T^{+0.01}_{0}$ T dimension can be designated in 0.01mm increments when using TK1	Quotation
	TK2	Changes T dimension tolerance. T±0.1 ···→ $T^{+0.02}_{+0.01}$ T dimension can be designated in 0.01mm increments when using TK2	
	TK3	Changes T dimension tolerance. T±0.1 ···→ T±0.005 T dimension can be designated in 0.01mm increments when using TK3	

URETHANE WASHERS

Non JIS material definition is listed on P.1351 - 1352

RoHS



UW
$d^{+0.4}_{+0.1}$
$D^{0}_{-0.5}$
$T^{0}_{-0.3}$

Although urethane itself has a heat resistant temperature of 100℃, when used continuously its durability falls, so use it at a temperature of no more than 80℃.

H Shore D58

D	d	Part Number Type	Part Number d	T	U/Price 1～19 T1.5	U/Price 1～19 T3
16	10	UW	10	1.5 3	Quotation	
18	13		13			
24	16		16			
27	20		20			

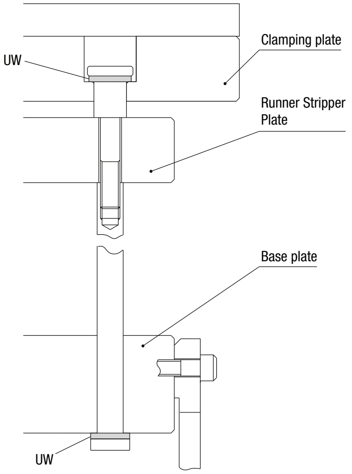
Order

Part Number		T
UW10	—	1.5

Days to Ship Quotation

Price Quotation

Example Use for sound proofing when the mold is being opened.

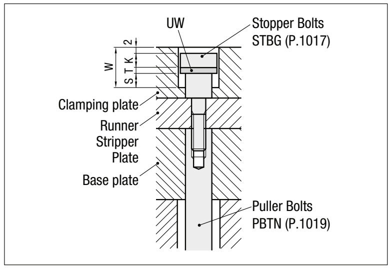


UW
Clamping plate
Runner Stripper Plate
Base plate
UW

■Characteristic comparison (With Shore A95)

Characteristics	Unit	Shore D58	Shore A95
Tensile strength	MPa	47.8	39.2
Elongation	%	440	400
Tearing strength	kgf/cm	153	107
Repulsion elasticity	%	53	40
Permanent warp	%	39	45
Heatproof temperature	℃	100	80

The above value is the reference value. It is not a guarantee value.



UW
Stopper Bolts STBG (P.1017)
W
S
T
K
2
Clamping plate
Runner Stripper Plate
Base plate
Puller Bolts PBTN (P.1019)

- When using a urethane washer on the stopper bolt, be careful of the counterbore depth (W) in order to secure the necessary stroke (S) .
- The dimension of the stopper bolt has been set so that the head is recessed 2mm below the clamping plate. (Refer to stopper bolt STBG P.1011.) When a urethane washer is used, the relationship between the counterbore depth (W) and the stroke (S) becomes as follows : [W=S+urethane washer thickness T+stopper bolt flange thickness K+2].

■Stopper Bolts STBG (P.1011) Size K table

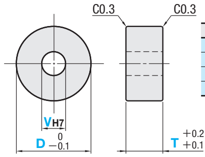
STBG	
D diameter	K head
10	8
13	8
16	13
20	13

For heat insulation
SUS416

WASHER (RISER PADS)

RoHS

RPSK (Dowel pin type)



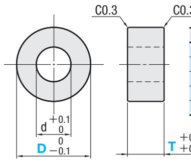
VH7	
8	$^{+0.015}_{0}$
10	
12	$^{+0.018}_{0}$
13	

M SUS416

Part Number Type	D	V	T	U/Price 1~19
RPSK	25	8 10	10	Quotation
			15	
			20	
	30	8 10 12	10	
			15	
			20	
	40	10 12 13	10	
			15	
			20	

RoHS

RPSB (Bolt type)



Applicable bolt size	d
M 6	7
M 8	9
M10	11
M12	13
M16	17

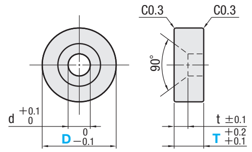
M SUS416

Part Number Type	D	M (Applicable bolt size) Selection	T	U/Price 1~19
RPSB	25	6 8 10	10	Quotation
			15	
			20	
	30	8 10 12 16	10	
			15	
			20	
	40	8 10 12 16	10	
			15	
			20	

RoHS

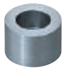
Applicable bolt size	d	t
M 6	6.2	3.5
M 8	8.2	4.6
M10	10.2	5.7

RPST (For flat head screw)



M SUS416

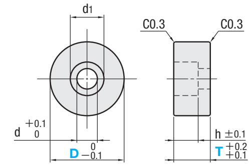
Part Number Type	D	M (Applicable bolt size) Selection	T	U/Price 1~19
RPST	30	6 8	10	Quotation
			15	
			20	
	40	6 8 10	10	
			15	
			20	



RoHS

Applicable bolt size	d	d1	h
M 6	6.2	11	6.5
M 8	8.2	14	8.6
M10	10.2	17.5	10.8
M12	12.2	20	13

RPSZ (Counterbore type)



M SUS416

Part Number Type	D	M (Applicable bolt size) Selection	T	U/Price 1~19
RPSZ	25	6	10	Quotation
			15	
			20	
	30	6	10	
			15	
			20	
		8 10	15	
			20	
	40	6	10	
			15	
			20	
		8 10	15	
			20	
		12	20	

Order

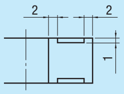
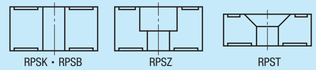
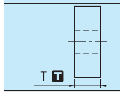
Part Number	—	V,M	—	T
RPSK30	—	V12	—	T15
RPSB40	—	M12	—	T20

Days to Ship Quotation

Price Quotation

Alterations

Part Number — V,M — T — (MK · TK1 · TK2 · TK3)
RPSZ30 — M8 — T15 — MK

Alterations	Code	Spec.	1Code
	MK	Adds a groove on both sides in order to facilitate insulation. ⊗ Express services not available  RPSK · RPSB RPSZ RPST Forming marks sometimes remain on the bottom face of the formed groove.	Quotation
	TK1 TK2 TK3	Changes T dimension tolerance. Code / T: TK1 $^{+0.02}_{0}$; TK2 ±0.01; TK3 $^{0}_{-0.02}$ All pieces are grinded together when 20 pieces or less are ordered. (Although T dimension tolerance is as stated in the left table, variation will be limited within 0.01.)	

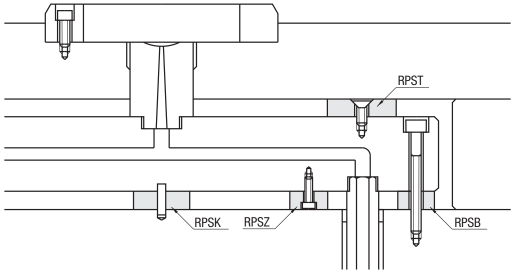
Notes that designated tolerance of TK alteration is different from that of free washer (P.1199), and free washer For heat insulation (**Right page**).

Example

SUS416 has a small heat transmission rate and is effective in cutting off heat.

Material	Thermal conductivity coefficient [cal／cm·sec·℃] (100℃)	Thermal expansion coefficient [×10⁻⁶／℃] (100℃)
SUS416	0.058	9.9
S50C	0.120	11.5

1cal／cm · sec · ℃＝418.6W／(m · k)



For heat insulation
SUS416

FREE WASHERS

—PLAIN／FOR COUNTERSUNK BOLT／COUNTERBORE—

SUS416 has low coefficient of thermal conductivity, so it is effective for blocking off heat.

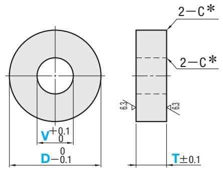
Material	Coefficient of thermal conductivity [cal／cm · sec · ℃] (100℃)	Coefficient of thermal expansion [×10⁻⁶／℃] (100℃)
SUS416	0.058	9.9
S50C	0.120	11.5

1cal／cm · sec · ℃＝418.6W／(m · k)

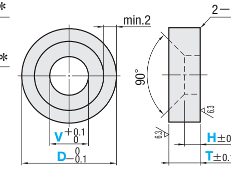
Non JIS material definition is listed on P.1351 - 1352

RoHS

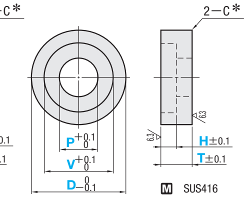
Plain
MWSCS



For countersunk bolt
MWFBS



Counterbore
MWZCS



C* ···› D≦16···C0.1~0.3 D>16···C0.2~0.5

M SUS416

Part Number	D	T	V	P	H	U/Price 1~9 MWSCS	MWFBS	MWZCS
Plain **MWSCS** For countersunk bolt **MWFBS** Counterbore **MWZCS** (D≧10 T≧3.0)	5.0~10.0 (0.1mm increments)	1.0~ 5.0	Plain For countersunk bolt 3.0~70.0 Counterbore 5.0~70.0	Counterbore only 3.0~68.0	For countersunk bolt 0≦H<T Counterbore 1.0≦H≦48.0	Quotation		
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						
	10.1~20.0 (0.1mm increments)	1.0~ 5.0						
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						
	20.5~30.0 (0.5mm increments)	1.0~ 5.0						
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						
	30.5~40.0 (0.5mm increments)	1.0~ 5.0						
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						
	40.5~60.0 (0.5mm increments)	1.0~ 5.0						
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						
	60.5~80.0 (0.5mm increments)	2.0~ 5.0						
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						
	80.5~100.0 (0.5mm increments)	2.0~ 5.0						
		5.1~10.0						
		10.1~20.0						
		20.1~30.0						
		30.1~40.0						
		40.1~50.0						

Plain
D>50 ···› T≧2 : To make D size larger than 50mm, the thickness (T) must be T2 or more.
D−V≧2 ···› The wall thickness must be 1mm or more on each side.

For countersunk bolt
D>50 ···› T≧2 : To make D size larger than 50mm, the thickness (T) must be T2 or more.
$\frac{D-V}{2}-(T-H)\geqq 1$ ···› The wall thickness must be at least 1mm.

Counterbore
(D−V)/2≧1 ···› The wall thickness (T) must be at least 1mm on each side.
(V−P)≧2 ···› A step of 1mm or more is required on each side.
P×8≧(T−H)≧2 ···› The bearing bore length (T-H) is between 2mm and P×8.

Order

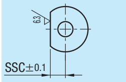
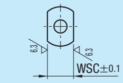
Part Number	—	D	—	T	—	V	—	P	—	H
MWSCS	—	D20.0	—	T6.0	—	V6.0				
MWFBS	—	D20.0	—	T6.0	—	V6.0			—	H3.0
MWZCS	—	D20.0	—	T6.0	—	V6.0	—	P4.0	—	H3.0

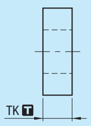
Quotation

Alterations

Part Number — D — T — V — P — H — (SSC · WSC · TK)
MWFBS — D30.0 — T3.0 — V10.0 — H1.0 — TK1

P Quotation

Alterations	Code	Spec.	1Code
	SSC	Cuts a face. SSC＝1mm increments SSC≧V/2+2 SSC≦D/2−1 ⊗ Not available for D5~D8.	Quotation
	WSC	Cuts two faces. WSC＝1mm increments WSC≧V+4 WSC≦D−2 ⊗ Not available for D5~D8.	

Alterations	Code	Spec.	1Code
	TK1	Changes T dimension tolerance. T±0.1 ···› T$^{+0.01}_{0}$ T dimension can be designated in 0.01mm increments when using TK1	Quotation
	TK2	Changes T dimension tolerance. T±0.1 ···› T$^{+0.02}_{+0.01}$ T dimension can be designated in 0.01mm increments when using TK2	
	TK3	Changes T dimension tolerance. T±0.1 ···› T±0.005 T dimension can be designated in 0.01mm increments when using TK3	

Note that designated tolerance of TK alteration is different from that of free washer For heat insulation (**Left page**).

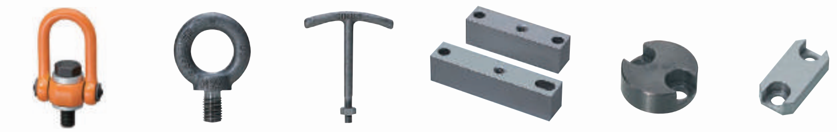
PROGRESSIVE
9999980
ProFileCV.com/BQ00582

MOLD ACCESSORIES

MOLD ACCESSORIES

Product Name	Dowel pins				Dowel pins				Package products Dowel Pins MSTH	Dowel Pin Extractors	
Part Number	MS	MSV	MSTP	MST	MSTM	MTT	MSSH	MSTH	100・200PACK—MSTH	KNHN	KNHN—□
Page	1203	1203	1203	1203	1204	1204	1204	1204	1205	1205	1205

		Magnets			Heat Resistant Magnets		Distance Spacers		Name Plates for Plastic Mold		Adjustment Collars
MG	MGN	HX	HXU	HXMB	HXH	HXUH	DS	DSN	PKNPS	PKNP	KACL
1206	1206	1206	1206	1206	1206	1206	1207	1207	1208	1208	1208

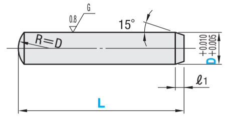


Swivel Lifting Eye Bolts	Lifting Eye Bolts	Lifting T-shaped bolts	Lifting Bars for Mold		Holding Plates for Pin	Holding Plates for Pin
SLEB	CHI	TB	KTA	KTB	CPHP	APP
1210	1211	1211	1212	1212	1213	1213

Core Pin Hold Screw Plugs	Positioning Screw Plugs		Slotted Keys	Shot Counters for Mold		
MSWPN	MSWG	MSWGP	KE□・KE□S	M—CVPL	M—CVEX	M—CVR
1214	1214	1214	1215	1216	1216	1216

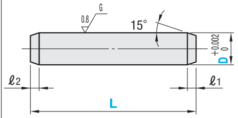
DOWEL PINS

MS (Straight type)



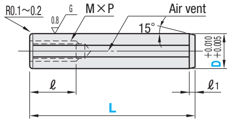
M SUJ2
H 58HRC~

MSV (Precision type)



M SUJ2
H 58HRC~

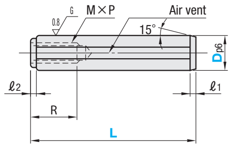
MSTP (Precision type with tapping)



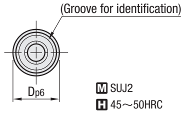
When L=10, the tap on D5/D6 is a through hole.

M SUJ2
H 58HRC~

MST (p6 type with tapping)



When L=10, the tap on D5/D6 is a through hole.



M SUJ2
H 45~50HRC

In the polishing process of outer diameter, ℓ1 and ℓ2 dimensions may be greater than those described on the table.

ℓ1	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~499	Slide Unit Price 500~2000
0.4	MS	1	6 8 10	Quotation		
0.6		1.5	6 8 10			
1.0		2	6 8 10 15 20			
		2.5	6 8 10 15 20 25 30			
		3	6 8 10 15 20 25 30 35 40			
1.5		4	8 10 15 20 25 30 35 40 45 50			
		5	8 10 15 20 25 30 35 40 45 50			
2.0		6	8 10 15 20 25 30 35 40 45 50 55 60			
2.5		8	10 15 20 25 30 35 40 45 50 55 60 65 70 80			
3.0		10	15 20 25 30 35 40 45 50 55 60 65 70 80			
3.5		12	20 25 30 35 40 45 50 55 60 70 80			
		13	30 40 50 60 70 80			

ℓ1	ℓ2	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~499	Slide Unit Price 500~1999	Slide Unit Price 2000~4000
1.0	0.2	MSV	2	6 8 10	Quotation			
	0.5		3	8 10 15 20 25 30				
1.5			4	10 15 20 25 30				
			5	10 15 20 25 30				
2.0			6	10 15 20 25 30				
2.5			8	20 30 40				
3.0			10	30 40 50 60				

Sizes of the high precision dowel pins are measured in a thermostatic chamber.

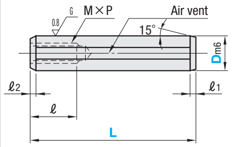
ℓ1	M×P	ℓ	D	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~500
1.5	M3×0.5	*6	+0.010 +0.005	MSTP	5	10 15 20 25 30	Quotation	
2.0	M4×0.7	*8			6	20 30 10 15 25 35 40 50		
	M5×0.8				8	30 15 20 25 35 40 45 50 60 70 80		
2.5	M6×1.0	10			10	40 15 20 25 30 35 45 50 60 70 80		
					12	20 30 40 50 60 70 80		
	M8×1.25	15			13	50 40 60 70 80		
3.0					16	40 50 60 70		

* ℓ=6 is a reference value when D=5. * ℓ=6 only when D=6, L=10

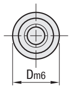
ℓ1	ℓ2	M×P	ℓ	Dp6	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~500
1.5	0.5	M3×0.5	*6	+0.020 +0.012	MST	5	10 15 20 25 30	Quotation	
2.0		M4×0.7	*8			6	20 30 10 15 25 35 40 50		
	0.7	M5×0.8		+0.024 +0.015		8	30 15 20 25 35 40 45 50 60 70 80		
2.5		M6×1.0	10			10	40 15 20 25 30 35 45 50 60 70 80		
	1.0			+0.029 +0.018		12	20 30 40 50 60 70 80		
		M8×1.25	15			13	50 40 60 70 80		
3.0						16	60 40 50 70 80		
		M10×1.5	18	+0.035 +0.022		20	50 60 70 80		

* ℓ=6 is a reference value when D=5. * ℓ=6 only when D=6, L=10

MSTM (m6 type with tapping)

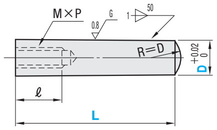


When L=10, the tap on D5/D6 is a through hole.



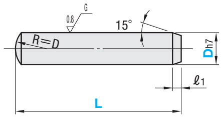
M SUJ2
H 45~50HRC

MTT (Taper type with tapping)



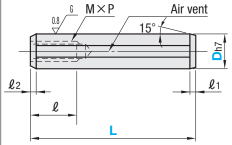
M SK4
H 45~50HRC

MSSH (Straight h7 type)



M SUJ2
H 58HRC~

MSTH (h7 type with tapping)



When L=10, the tap on D5/D6 is a through hole.

M SUJ2
H 45~50HRC

Non JIS material definition is listed on P.1351 - 1352

In the polishing process of outer diameter, ℓ1 and ℓ2 dimensions may be greater than those described on the table.

ℓ1	ℓ2	M×P	ℓ	Dm6	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~500
1.5	0.3	M3×0.5	*6	+0.012 +0.004	MSTM	5	10 15 20 25 30	Quotation	
2.0		M4×0.7	*8			6	20 30 10 15 25 35 40 50		
	0.5	M5×0.8		+0.015 +0.006		8	30 15 20 25 35 40 45 50 60 70 80		
2.5		M6×1.0	10			10	40 15 20 25 30 35 45 50 60 70 80		
	1.0			+0.018 +0.007		12	20 30 40 50 60 70 80		
		M8×1.25	15			13	50 40 60 70 80		
3.0	1.5					16	60 40 50 70 80		
		M10×1.5	18	+0.021 +0.008		20	50 60 70 80		

* ℓ=6 is a reference value when D=5. * ℓ=6 only when D=6, L=10

M×P	ℓ	Part Number Type	Part Number D	L	U/Price 1~499	Slide Unit Price 500~999	Slide Unit Price 1000~1999	Slide Unit Price 2000~4000
M 5×0.8	9	MTT	8	30 40	Quotation			
M 6×1.0	10		10	40 50				
			12	40 50				
M 8×1.25	14		13	50 60				
M10×1.5	16		16	60 70				

ℓ1	Dh7	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~499	Slide Unit Price 500~1999	Slide Unit Price 2000~4000
1.0	0 −0.010	MSSH	2	6 8 10 15	Quotation			
			3	8 10 15 20				
1.5	0 −0.012		4	10 15 20				

ℓ1	ℓ2	M×P	ℓ	Dh7	Part Number Type	Part Number D	L	U/Price 1~299	Slide Unit Price 300~500
1.5	0.3	M3×0.5	*6	0 −0.012	MSTH	5	10 15 20 25 30	Quotation	
2.0		M4×0.7	*8			6	10 15 20 25 30 35 40 50		
	0.5	M5×0.8		0 −0.015		8	15 20 25 30 35 40 45 50 60 70 80		
2.5		M6×1.0	10			10	15 20 25 30 35 40 45 50 60 70 80 100 120		
	1.0			0 −0.018		12	20 30 40 50 60 70 80 100 120		
		M8×1.25	15			13	40 50 60 70 80 100 120		
3.0	1.5					16	40 50 60 70 80 100 120 150		
		M10×1.5	18	0 −0.021		20	60 70 80 100		

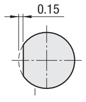
* ℓ=6 is a reference value when D=5. * ℓ=6 only when D=6, L=10 Packing sales of **MSTH** P.1205

Order

Part Number	—	L
MS2	—	20

Days to Ship Quotation

Depth of air vent The figure is for reference only due to barrel polishing.



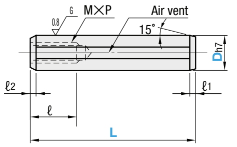
The same depth is applicable for all D dimensions.
Subject items: **MSTP**
MST
MSTM
MSTH

DOWEL PINS (PACKAGE PRODUCTS) ／ DOWEL PIN EXTRACTORS

h7 type with tapping

RoHS

100PACK－MSTH(100)
200PACK－MSTH(200)



When L=10, the tap on D5/D6 is a through hole.

M SUJ2
H 45～50HRC

ℓ_1	ℓ_2	M×P	ℓ	Dh7	Part Number PACK	Part Number Type	Part Number D	L
1.5	0.3	M3×0.5	*6	0 −0.012	100PACK (contains 100pcs.) 200PACK (contains 200pcs.)	MSTH	5	10 15
2.0	0.3	M4×0.7	6				6	10
			8					15 20 25 30
2.0	0.5	M5×0.8	8	0 −0.015			8	20 30 40
2.5	0.5	M6×1.0	10				10	30 40

* ℓ=6 is a reference value when D=5.

Order

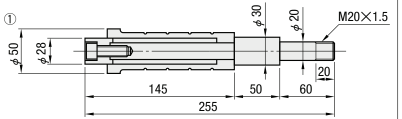
Part Number PACK	Type	D	—	L
(For 100 pcs.) 100 PACK	MSTH	6	—	20
(For 200 pcs.) 200 PACK	MSTH	6	—	20

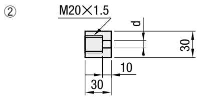
Days to Ship Quotation

■Dowel Pin Extractors

RoHS

KNHN (①Body＋②Each of the holder caps)
KNHN－B (For ① only)
KNHN－M (For ② only)





① Body
M S45C
H 38～42HRC
② One holder cap each for M4/M5/M6/M8/M10

Part Number	U/Price 1～9 Set	Slide Unit Price 10～20
KNHN (①＋②)	Quotation	

Part Number	U/Price 1～9	Slide Unit Price 10～20
KNHN－B (For ① only)	Quotation	

d	Part Number Type	Part Number No.	U/Price 1～9	Slide Unit Price 10～20
4.2	**KNHN－M** (For ② only)	4	Quotation	
5.2		5		
6.3		6		
8.5		8		
10.5		10		

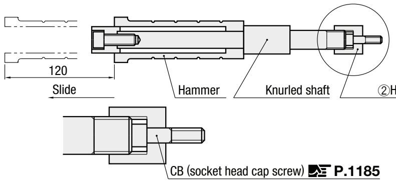
Order

Part Number
KNHN
KNHN－M5
KNHN－B

Days to Ship Quotation

■**Usage**

1. Insert a socket head cap screw (CB) into a holder cap.
2. Attach the holder cap ② on top of this extractor.
3. Rotate the extractor's knurled shaft and attach the screw to the dowel pin to be extracted.
4. Slide the hammer and extract the dowel pin.

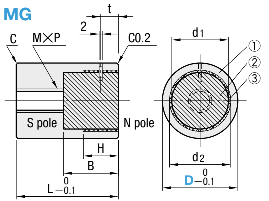


MAGNETS／HEAT RESISTANT MAGNETS

Non JIS material definition is listed on P.1351 - 1352

RoHS

MG



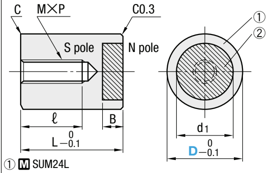
① M SUM24L ③ M Brass (C3604BD)
② M Alnico magnet Heat resistant temperature 80℃

L	M×P	Adsorptivity* N{kgf}	Surface magnetic flux density Gauss [G]	d_1	d_2	B	C	H	t	Part Number Type	Part Number D	U/Price 1～19
15	M5×0.8	5.9 {0.6}	1100～1300	6	8	7	0.5	5	2.5	MG	10	Quotation
		11.8 {1.2}		8	10.5		1.0				13	
20	M6×1.0	15.7 {1.6}	1200～1400	10	13	10		6	3.5		16	
25	M8×1.25	29.4 {3.0}	1200～1500	13	16	12	1.5	9	6.5		20	
30		44.1 {4.5}	1300～1700	15.5	18	13					25	
		78.5 {8.0}	1400～1700	20	23.5	15					28	

Load {kgf}＝Load N×0.101972 * Adsorptivity: Refer to the figure below.
Magnet section cannot be altered since it will be damaged.
Magnets and holders are fixed with adhesive.

RoHS

MGN (Strong rust-prevention type)



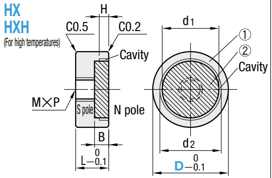
① M SUM24L
S Electroless nickel plated
② M Rare earth magnet Heat resistant temperature 80℃

L	M×P	Adsorptivity* N{kgf}	Surface magnetic flux density Gauss [G]	d_1	B	C	ℓ	Part Number Type	Part Number D	U/Price 1～19
10	M3×0.5	2.9 { 0.3}	3000～3200	4.0	2.0	0.3	6	MGN	6	Quotation
		5.8 { 0.6}	3500～3700	5.0					8	
15	M5×0.8	9.8 { 1.0}	3400～3600	6.0		0.5	10		10	
		15.6 { 1.6}	3200～3400	7.0	1.5				13	
20	M6×1.0	36.2 { 3.7}	3500～3700	9.5	2.0	1.0	12		16	
25	M8×1.25	58.8 { 6.0}	3100～3300	12.5			16		20	
30		112.7 {11.5}	3500～3700	16.5	3.0	1.5	18		25	
		196.1 {20.0}	3300～3500	18.5					28	

Load {kgf}＝Load N×0.101972 * Adsorptivity: Refer to the figure below.
Magnet section cannot be altered since it will be damaged.
Magnets and holders are fixed with adhesive.

RoHS

HX
HXH
(For high temperatures)



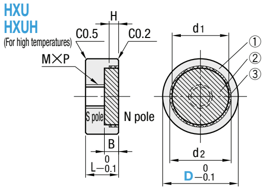
		HX	HXH
M	①	SUM24L	
	②	Cobalt Magnet	
S		—	Low-temperature black chromate plating
Heat resistant temperature		80℃	200℃

L	M×P	Adsorptivity* N{kgf}	Surface magnetic flux density Gauss [G]	d_1	d_2	B	H	Part Number Type	Part Number D	U/Price 1～19 HX	U/Price 1～19 HXH
6	M3×0.5	2.9 { 0.3}	2100～2600	4	5	2.0	1.5	HX Heat resistance: 80℃	6	Quotation	
		3.9 { 0.4}	2200～2600	5.5	6.5				8		
	M4×0.7	9.8 { 1.0}	2100～2300	7	8	1.5	1.1		10		
8		29.4 { 3.0}	2200～2400	9.5	11	2.0	1.6		13		
	M5×0.8	49.0 { 5.0}	2200～2500	12.5	14			HXH Heat resistance: 200℃	16		
10		88.3 { 9.0}	2300～2600	16.5	18	3.0	2.6		20		
13	M6×1.0	127.5 {13.0}		21.5	23				25		

Load {kgf}＝Load N×0.101972 * Adsorptivity: Refer to the figure below.
Magnet section cannot be altered since it will be damaged.
Magnets and holders are fixed with adhesive.
The magnetic surface is recessed by 0.1~0.3 from the case.

RoHS

HXU
HXUH
(For high temperatures)



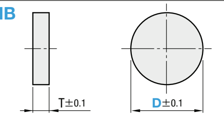
		HXU	HXUH
M	①	SUM24L	
	②	Cobalt Magnet	
	③	Brass (C3604BD)	
S		—	Low-temperature black chromate plating
Heat resistant temperature		80℃	200℃

L	M×P	Adsorptivity* N{kgf}	Surface magnetic flux density Gauss [G]	d_1	d_2	B	H	Part Number Type	Part Number D	U/Price 1～19 HXU	U/Price 1～19 HXUH
8	M3×0.5	3.9 { 0.4}	2100～2600	4	5	2	1.6	HXU Heat resistance: 80℃	6	Quotation	—
		5.9 { 0.6}	2400～2600	5	6				8		—
	M4×0.7	14.7 { 1.5}	2700～2900	7	8	3	2.1		10		
10		34.3 { 3.5}	2800～3100	9.5	11	4	3.1	HXUH Heat resistance: 200℃ D10～20	13		
	M5×0.8	58.8 { 6.0}	2900～3300	12.5	14				16		
13		98.1 {10.0}	2900～3400	16.5	18	6	5.1		20		
15	M6×1.0	137.3 {14.0}		21.5	23				25		

Load {kgf}＝Load N×0.101972 * Adsorptivity: Refer to the figure below.
Magnet section cannot be altered since it will be damaged.
Magnets and holders are fixed with adhesive.

RoHS

HXMB

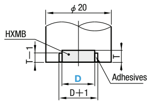


M Cobalt Magnet Heat resistant temperature 200℃

T	Adsorptivity* N{kgf}	Surface magnetic flux density Gauss [G]	Part Number Type	Part Number D	U/Price 1～19
2	1.0 {0.10}	2000～2100	HXMB (Heat Resistance: 200℃)	3	Quotation
	1.5 {0.15}			4	
	3.9 {0.40}			5	
1.5	6.9 {0.70}	2200～2400		7	

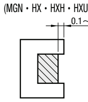
Load {kgf}＝Load N×0.101972 * Adsorptivity: Refer to the right figure.
Please handle with care since magnets are very fragile.
Magnets should be fixed with adhesives.

Magnets are fragile and should be fixed so that they do not project out of holder.

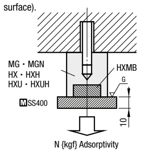


In order to prevent damage to the magnet, the magnet section is set back about 0.1～0.3 in the holder.

(MGN・HX・HXH・HXU・HXUH)



*"Absorptivity" shows the strength in lifting the accompanying material SS400 (10mm plate with polished surface).



Order

Part Number
MG 13
HX 20

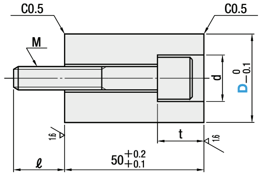
Days to Ship Quotation

Price Quotation

DISTANCE SPACERS

Free designation type (DSF) P.1001

DS



① M S45C
S Black Oxide
② A SCM435
Strength rank 12.9
Screw part: JIS B 0205 6g (Class 2)

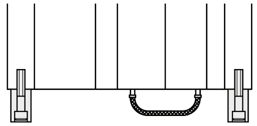
d	t	ℓ	M×Pitch (Coarse thread)	Part Number		U/Price
				Type	D	1~9
11	13	8	M 6×1.0	DS	19	Quotation
					20	
14	15	15	M 8×1.25		24	
					25	
					29	
					32	
17	18	18	M10×1.5		38	

Order Part Number
DS38

Days to Ship Quotation

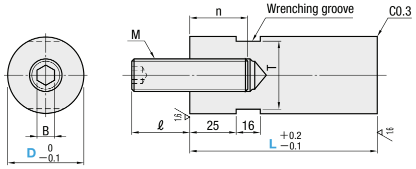
Price Quotation

Example



Used as legs for a mold, the distance spacers protect its components, such as plugs and nipples, when it is laid on the floor. P.1049~

DSN



① M SS400
S Black Oxide
② M SCM435
Strength rank 12.9
Screw part: JIS B 0205 6g (Class 2)

M (Coarse thread)	T	ℓ	n	B	Part Number		L	U/Price 1~9	
					Type	D		L50	L100
M12	17	20	20	6	DSN	20	50	Quotation	
M16	22	25	25	8		25			
M20	29	30	30	10		32	100		
M20	32	30	30	10		38			

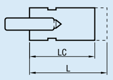
Order Part Number — L
DSN25 — 100

Days to Ship Quotation

Price Quotation

Alterations Part Number — LC
DSN20 — LC65

Quotation

Alteration	Code	Spec.	1Code
	LC	Shortens the full length. LC=5mm increments 50<LC<100	Quotation

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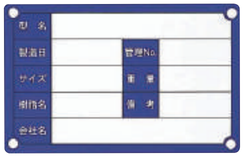
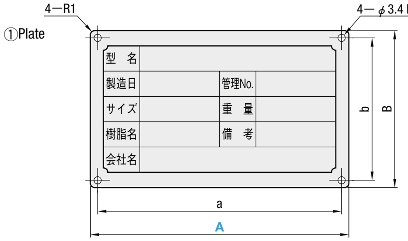
NAME PLATES FOR PLASTIC MOLD/ADJUSTMENT COLLARS

Non JIS material definition is listed on P.1351 - 1352

■**Name Plates for Plastic Mold** RoHS



PKNPS (①+②)
PKNP (For ① only)



② Installation bolts CB3−6 4 pieces

M A1050P
Thickness 0.5mm
S Baking finish

A	a	B	b	Part Number		U/Price 1~9	
				Type	A	PKNPS	PKNP
70	65	30	25	PKNPS (①+②)	70	Quotation	
80	75	50	45	PKNP (For ① only)	80		

■**Characteristics**
- It can be used in storing/managing molds.
- Oil-based pens or ball-point pens can be used.
- Since this is made of aluminum, it can be engraved with chisel and such.

■**Note on handling**
- Heat resistance of the surface finishing material is 150℃.

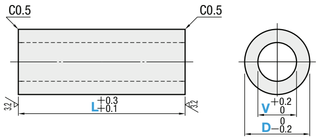
Order Part Number
PKNP70

Price Quotation

Days to Ship Quotation

■**Adjustment Collars** RoHS

KACL



M SS400

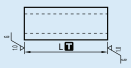
Part Number Type	D	L 1mm increments	V	U/Price 1~4			
				L5~50	L51~100	L101~150	L151~200
KACL	10	5~150	7	Quotation			—
	12		9.5				
	15		12				
	18		10.5				
	25		13				
	35	5~200	26				
	40		31				
	45		33				
	50		41				

Order Part Number — L — V
KACL18 — 145 — V10.5

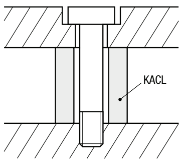
Price Quotation

Days to Ship Quotation

Alterations Part Number — L — V — (LKC)
KACL18 — 138.25 — V10.5 — LKC

Alteration	Code	Spec.	1Code
	LKC	Changes L dimension tolerance. $L^{+0.3}_{+0.1}$ ···▸ $L^{+0.05}_{0}$ Available for D≦40 and L≦150 L dimension can be designated at 0.01mm increments.	Quotation

Example



It can be used as a space adjustment collar.

GUIDE FOR SWIVEL LIFTING EYE BOLTS

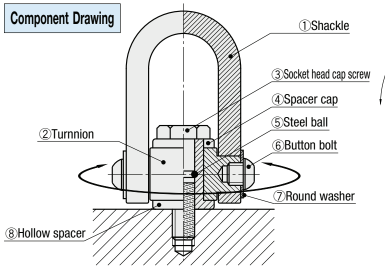
Features

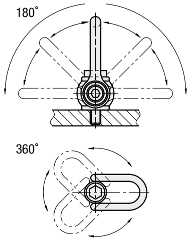
- Swivel Lifting Eye Bolt is available to rotate 360° against the heavy lift shaft. Also, available to rotate 180° against the lifting direction.
- Can safely use Swivel Lifting Eye Bolt even when the lifting work from side direction, beveled direction or under tensile condition which are dangerous with the conventional eye bolt of CHI.
- Compared with CHI, Swivel Lifting Eye Bolt has approx. three times allowance load with same bolt size. Available to use at small place by changing screw diameter M and outer dimension W smaller. Refer to right table

■Comparison on maximum allowance load

Bolt size	Maximum allowance load N {kgf}	
	Eyebolts (CHI)	Swivel eyebolts (SLEB)
M 8	785 {80}	2940 {300}
M10	1471 {150}	4900 {500}
M12	2157 {220}	7850 {800}
M16	4413 {450}	15690 {1600}
M20	6178 {630}	24520 {2500}
M24	9316 {950}	35300 {3600}
M30	14710 {1500}	56870 {5800}
M36	22555 {2300}	78450 {8000}
M42	33342 {3400}	98060 {10000}

Component Drawing

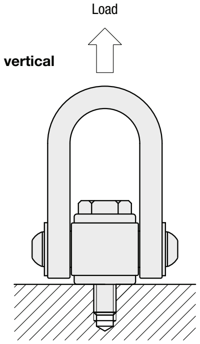




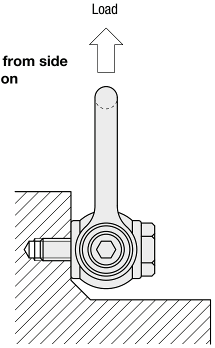
No.	Item name	M	H	S
①	Shackle	SCM435	28～33HRC	Coating painting
②	Turnnion	SCM435	28～33HRC	Coating painting
③	Socket head cap screw	SCM435	32～39HRC Strength rank: 10.9	Black oxide film
④	Spacer cap	S45C	24～28HRC	Trivalent Chromate
⑤	Steel ball	SUJ2	60～62HRC	—
⑥	Button bolt	SCM435	39～45HRC	Black oxide film
⑦	Round washer	SS400	—	Parkerizing
⑧	Hollow spacer	S45C	24～28HRC	Trivalent Chromate

Mounting Examples

■Lifting from vertical direction



■Lifting from side direction



For burning prevention, wipe off the screw part from the dirt and dust and install after lubrication if possible.

Notes

■Guide for installation

- Sit flange on the wider surface area than swivel lifting eye bolt and fasten bolts with right torque.

Note: Refer to right table on fastening torque indication.

- After installing swivel lifting eye bolt, need to verify if the shackle moves at 360° against the lift shaft and 180° against the lifting direction.

■Guide for lifting work

- As the shackle is designed for longitudinal load, do not directly hook larger bolt than inner diameter of the shackle.
- When using two or more eye bolts, need attention on the loading displacement to single eye bolt depending on the lift angle.
- This item has rotating function for changing lifting direction, however, do NOT continuously rotate eye bolt in loading condition.
- Sudden lifting work is dangerous. Lift carefully with slow in lifting speed. (Impact shock may be a cause of bolt or other parts damage)

■Guide for maintenance

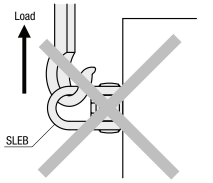
- Make regular check-up on the change in shape and cracking according to the load working condition and operation frequency.

Note: Use at ordinary temperature below 40℃.

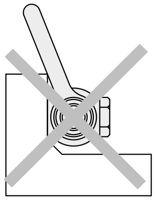
Caution

Strict prohibition

⊗ Do not hook in side load against the shackle



⊗ Make sure not to contact the lifting material and the shackle.

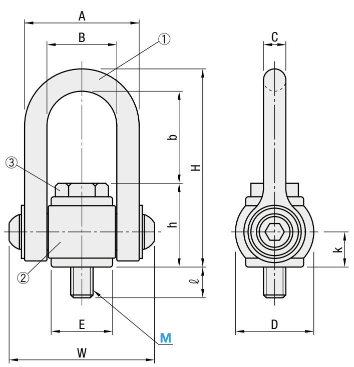


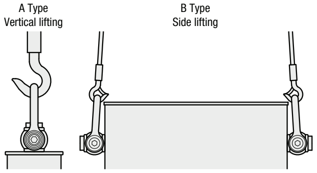
⊗ Absolutely refrain from installing thick washer in between eye bolt flange and lifting material due to sharp decline in allowable lifting load.

SWIVEL LIFTING EYE BOLTS

Non JIS material definition is listed on P.1351 - 1352

RoHS **SLEB**





① ② M SCM435
H 28～33HRC
S Coating painting

③ M SCM435
H 32～39HRC
S Black oxide film
(Strength rank 10.9)

M×P (Coarse thread)	A	B	C	D	ℓ	b	h	H	E		W	k	③Socket head cap screw side	Indication of fastening torque for Socket head cap screw (N・m)	Mass (kg)	Comparision on maximum allowance load N {kgf}		Part Number		U/Price
																A: Vertical lifting (Single bolt use)	B: Side lifting (Two bolts use)	Type	M	1～19
M 8×1.25	41	25	8	28	11	33	30	71	M8	24	50	9.7	13	7.8～ 14.7	0.18	2940 {300}	2940 {300}	SLEB	8	Quotation
M10×1.5					16	32	31		M10			12.7	17	9.8～ 24.5	0.19	4900 {500}	4900 {500}		10	
M12×1.75	50	30	10	32	21	40	38	88	M12	29	62	15	19	14.7～ 39.2	0.35	7850 {800}	7850 {800}		12	
M16×2.0	65	37	14	42	27	47	48	109	M16	36	79	18	24	39.2～ 98.1	0.75	15690 {1600}	15690 {1600}		16	
M20×2.5	83	47	18	50	31	60	57	135	M20	45	100	21	30	68.7～147.2	1.38	24520 {2500}	24520 {2500}		20	
M24×3.0	102	58	22	60	37	72	63	157	M24	56	121	24	36	98.1～245.3	2.38	35300 {3600}	35300 {3600}		24	
M30×3.5	128	72	28	75	50	90	79	197	M30	70	150	30	46	117.7～343.4	4.90	56870 {5800}	56870 {5800}		30	
M36×4.0	154	90	32	90	57	112	91	235	M36	85	176	34	55	147.2～490.5	7.60	78450 {8000}	78450 {8000}		36	
M42×4.5	176	104	36	105	67	130	109	275	M42	100	200	42	65	176.6～588.6	11.80	98060 {10000}	98060 {10000}		42	

Order

Part Number
SLEB12

Days to Ship **Quotation**

LIFTING EYE BOLTS／LIFTING T-SHAPED BOLTS

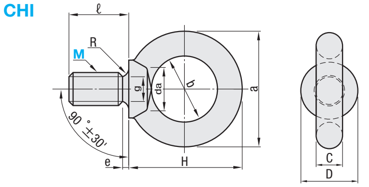
LIFTING BARS FOR MOLD

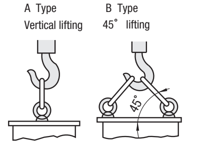
Non JIS material definition is listed on P.1351 - 1352

Lifting Eye Bolts—For vertical lifting—

RoHS

CHI





M SS400
Bolt precision JIS1168

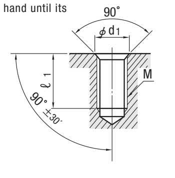
M×P (Coarse thread)	a	b	C	D	H	ℓ	e	g	R	da	Maximum allowance load N {kgf} A: Vertical 1 Pc.	Maximum allowance load N {kgf} B: 45° 2 Pcs.	Part Number Type	Part Number M	U/Price 1~19	Slide Unit Price 20~49	Slide Unit Price 50~99	Slide Unit Price 100~200
M 6×1.0	24.9	14.5	5.2	12.8	28.45	15	3	4.7	1.0	7.9	392 {40}	392 {40}	CHI	6	Quotation			
M 8×1.25	32.6	20	6.3	16	33.3	15	3	6	1.0	9.2	785 {80}	785 {80}		8				
M10×1.5	41	25	8	20	41.5	18	4	7.7	1.2	11.2	1471 {150}	1471 {150}		10				
M12×1.75	50	30	10	25	51	22	5	9.4	1.4	14.2	2157 {220}	2157 {220}		12				
M16×2.0	60	35	12.5	30	60	27	5	13	1.6	18.2	4413 {450}	4413 {450}		16				
M20×2.5	72	40	16	35	71	30	6	16.4	2	22.4	6178 {630}	6178 {630}		20				
M24×3.0	90	50	20	45	90	38	8	19.6	2.5	26.4	9316 {950}	9316 {950}		24				
M30×3.5	110	60	25	60	110	45	8	25	3	33.4	14710 {1500}	14710 {1500}		30				
M36×4.0	133	70	31.5	70	131.5	55	10	30.3	3	39.4	22555 {2300}	22555 {2300}		36				
M42×4.5	151	80	35.5	80	150.5	65	12	35.6	3.5	45.6	33342 {3400}	33342 {3400}		42				
M48×5.0	170	90	40	90	170	70	12	41	4	52.6	44130 {4500}	44130 {4500}		48				

• Load {kgf}=Load N×0.101972

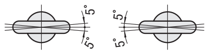
■How to Mount

Fasten the eye bolt lightly by hand until its seat firmly sits on the plate.

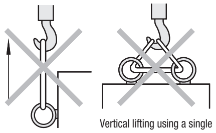
Part Number		d1	ℓ1
CHI	6	9	17
	8	11	17
	10	13	20
	12	16	24
	16	20	30
	20	24	34
	24	28	42
	30	36	50
	36	42	60
	42	48	70
	48	56	76



When using two-bolts of the eye bolts, set them in the same direction.



Caution
Bad example
These applications shown below should never be practiced.



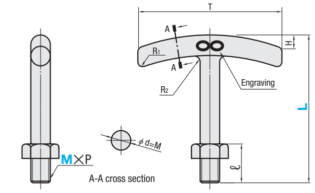
Side lifting

Vertical lifting using a single rope for two eye bolts.

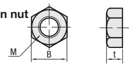
Lifting T-shaped Bolts

RoHS

TB



Hexagon nut



M	B	t
8	13	6.5
10	17	8
12	19	10
16	24	13
20	30	16

M SS400
Bolt precision JIS1168
A Hexagon nut

M×P (Coarse thread)	H	R1	R2	T	R	N/1P {kgf/1P}	Part Number Type	Part Number M	L	U/Price 1~19
M 8×1.25	8	2	3	80	22	686 { 70}	TB	8	100	Quotation
M10×1.5	8	3	5	80	28	981 {100}		10	110	
M12×1.75	8	3	5	90	34	1471 {150}		12	125	
M16×2.0	10	5	6	100	45	2942 {300}		16	135	
M20×2.5	10	5	8	120	50	3923 {400}		20	160	

• Load {kgf}=Load N×0.101972

Order

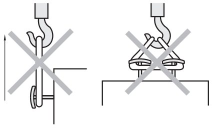
Part Number — L
CHI10
TB12 — 125

Days to Ship Quotation

Price Quotation

Caution

Bad example These applications shown below should never be practiced.



Side lifting

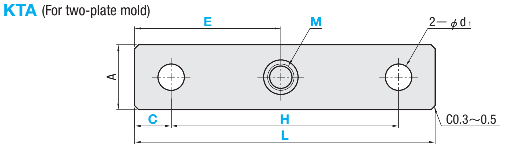
Two-bolts lifting

■How to Mount (Lifting T-shaped Bolts)

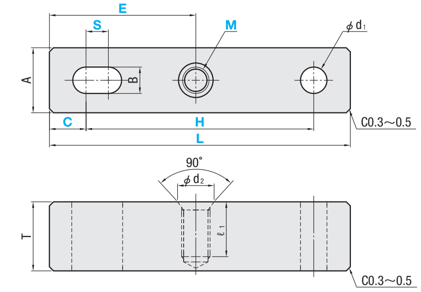
Fasten the T-shaped bolt lightly by hand, and tighten the nut until it firmly sits on the plate.
※Tightening the nut this way allows you to freely adjust the T-bar orientation.

RoHS

KTA (For two-plate mold)



KTB (For three-plate mold)



M S50C

Max. load N {kgf}	A	T	d1	B	d2	ℓ1	Part Number Type	Part Number M	1mm increments L	1mm increments E	1mm increments C	1mm increments H	1mm increments S
2058 {210}	30	36	13	13	16	25	KTA (For two-plate mold) KTB (For three-plate mold)	12	100~350	$C+S+40\leqq E\leqq \frac{L}{2}$	9~20	$9\leqq L-C-H\leqq 20$	$0<S\leqq 15$ (Required for KTB only)
4312 {440}	40	52	18	18	20	30		16	124~460	$C+S+50\leqq E\leqq \frac{L}{2}$	12~25	$12\leqq L-C-H\leqq 25$	
5978 {610}	45	60	22	22	24	35		20	150~470	$C+S+60\leqq E\leqq \frac{L}{2}$	15~25	$15\leqq L-C-H\leqq 25$	

• Load {kgf}=Load N×0.101972

The maximum load values are based on maximum L size with a safety factor of 10. Do not overload.
Calculate KTA's E size with S=0.
• Applicable bolts: JIS B 1176 or JIS B 1180 of strength rank 12.9 or 10.9.

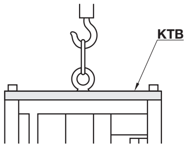
Order

Part Number — L — E — C — H — S(KTB)
KTA12 — 196 — E95 — C10 — H176
KTB16 — 438 — E215 — C15 — H408 — S10

Days to Ship Quotation

Price Quotation

Example



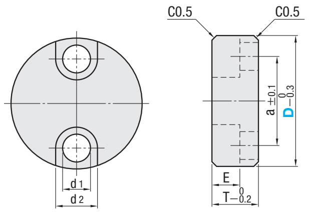
HOLDING PLATES FOR PIN

CORE PIN HOLD SCREW PLUGS／POSITIONING SCREW PLUGS

Non JIS material definition is listed on P.1351 - 1352

RoHS

CPHP



M S45C
S Black Oxide (Fe_3O_4)

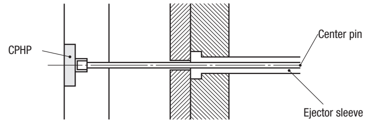
Pin head dia. (reference value)	Applicable bolt size	a	d1	d2	E	T	Part Number Type	D	U/Price 1～9
ϕ 5 or less	M4	12	5	8	5.5	8	CPHP	20	Quotation
ϕ 9 or less		16						25	
ϕ 11 or less	M6	20	7	11	7	11.5		30	
ϕ 15 or less		24						34	
ϕ 20 or less		30						40	

☎ Order — Part Number: **CPHP30**

Days to Ship: Quotation

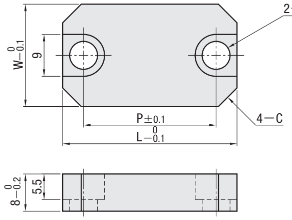
Price: Quotation

Example



RoHS

APP



M S45C

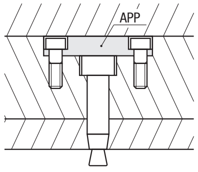
Pin head dia. (reference value)	Applicable bolt size	W	L	P	C	Part Number Type	No.	U/Price 1～9
ϕ 9 or less	M5	13	28	19	2	APP	6	Quotation
ϕ 13 or less		16	32	23	3		10	
ϕ 19 or less		22	38	29	5		16	
ϕ 23 or less		26	42	33	6		20	

☎ Order — Part Number: **APP10**

Days to Ship: Quotation

Price: Quotation

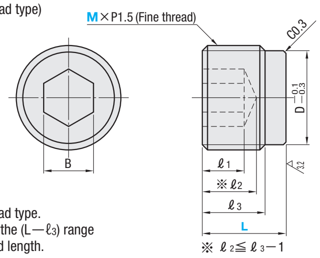
Example



Can also be used as a backup plate for runner lock pins.

■Core Pin Hold Screw Plugs RoHS

MSWPN (Fine thread type)



MSWPN is fine thread type.
Can be used within the (L−ℓ3) range to meet the required length.

M S45C
H 34～43HRC
S Black Oxide (Fe_3O_4)
Screw part Class 2 JIS B0205

M×Pitch (Fine thread)	D	B	ℓ1	ℓ2 max.	ℓ3	L−ℓ3	Part Number Type	M	L	U/Price 1～99
M12×1.5	10	6	4	11	12	3	MSWPN (Fine thread type)	12	15	Quotation
M16×1.5	14	8						16	15	
M20×1.5	15	10	5	9	10	5		20	15	
M24×1.5	21	12	9	14	15			24	20	
M30×1.5	25	14	11	17	18	7		30	25	

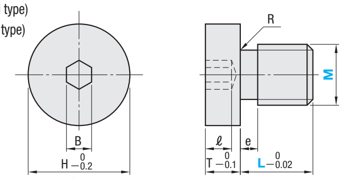
☎ Order — Part Number — L: **MSWPN24 — 20**

Price: Quotation

Days to Ship: Quotation

■Positioning Screw Plugs RoHS

MSWG (Coarse thread type)
MSWGP (Fine thread type)



MSWG is coarse thread type, MSWGP is fine thread type.

M SCM435
H 33～38HRC
Screw part Class 2 JIS B0205 6g

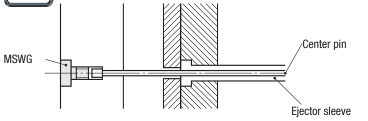
H	T	B	ℓ	e	R	M×Pitch	Part Number Type	M	L	L	U/Price 1～19	Slide Unit Price 20～49
5.5	2	1.5	2	1.0	0.2	M 3×0.5 (Coarse thread)	MSWG (Coarse thread type)	3	4	6	Quotation	
7	2.5	2		1.5	0.3	M 4×0.7 (Coarse thread)		4	5.5	7.5		
8.5	3	2.5	3			M 5×0.8 (Coarse thread)		5	6	8		
10	3.5	3				M 6×1.0 (Coarse thread)		6	6.5	8.5		
13	4	4	4	2.0	0.5	M 8×1.25 (Coarse thread)		8	9	11		
16		5				M10×1.5 (Coarse thread)		10				
18		6				M12×1.75 (Coarse thread)		12				
22	5	8	5			M16×2.0 (Coarse thread)		16	11	13		
24		10				M18×2.5 (Coarse thread)		18	13	15		
26	6	12				M20×2.5 (Coarse thread)		20	15	17		
18	4	6	4	2.0	0.5	M12×1.5 (Fine thread)	MSWGP (Fine thread type)	12	8	9		
22	5	8	5			M16×1.5 (Fine thread)		16	9	11		
24		10				M18×1.5 (Fine thread)		18	10	13		
26	6	12				M20×1.5 (Fine thread)		20	10	15		

☎ Order — Part Number — L: **MSWG6 — 8.5**

Days to Ship: Quotation

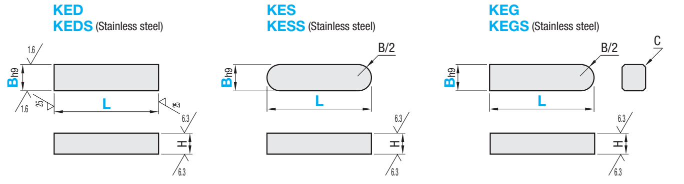
Example

This screw plug features high-precision length, making it suitable for applications that require accuracy in depth. As shown in the drawing, it can be used as the set plug that enables automatic center adjustment of the center pin.



SLOTTED KEYS

RoHS


KED
KEDS (Stainless steel)
KES
KESS (Stainless steel)
KEG
KEGS (Stainless steel)
Bh9
L
H
B/2
C
1.6
6.3

JIS B1301—1996
Tensile strength: 600N/mm² or more

Type			M
KED	KES	KEG	S45C
KEDS	KESS	KEGS	SUS316

Part Number			L	H		C
Type	Bh9			Tolerance		
KED KEDS (Stainless steel)	2	0 −0.025	10 15 20	2	0 −0.025	0.16~0.25
	3		10 15 20 25 30	3		
	4	0 −0.030	10 12 15 16 18 20 25 30 35 40 45 50	4	0 −0.030	
	5		10 12 15 16 18 20 25 30 35 40 45 50	5		0.25~0.40
	6		10 12 15 16 18 20 25 30 35 40 45 50 55 60	6		
KES KESS (Stainless steel)	7	0 −0.036	15 20 25 30 35 40 45 50 55 60	7	0 −0.036	
	8		15 16 18 20 25 30 35 40 45 50 55 60 70 80		0 −0.090	
	10		15 18 20 25 30 35 40 45 50 55 60 70 80	8		
KEG KEGS (Stainless steel)	12	0 −0.043	20 25 30 35 40 45 50 55 60 70 80			0.40~0.60
	14		30 35 40 45 50 55 60 70 80 90	9		
	15		30 35 40 45 50 55 60 70 80 90	10		
	16		40 45 50 55 60 70 80 90 100			
	18		40 45 50 55 60 70 80 90 100 110	11	0 −0.110	

L	Tolerance
10	0 −0.15
12 15 16 18	0 −0.18
20 25 30	0 −0.21
35 40 45 50	0 −0.25
55 60 70 80	0 −0.30
90 100 110	0 −0.35

Order

Part Number	—	L
KED6	—	30

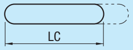
Price Quotation

Days to Ship Quotation

Alterations

Part Number	—	L(C)
KED6	—	LC28

Quotation

Alteration	Code	Spec.	1Code
Full length alteration  LC	LC	L dimension can be designated in 1mm increments. B / LC range: 2 / 5~20; 3 / 6~30; 4 / 8~50; 5 / 8~50; 6 / 10~60; 7 / 15~60; 8 / 15~80 B / LC range: 10 / 15~ 80; 12 / 20~ 80; 14 / 25~ 90; 15 / 25~ 90; 16 / 35~100; 18 / 35~110	Quotation

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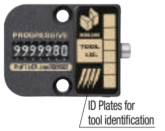
SHOT COUNTERS FOR MOLD

Non JIS material definition is listed on P.1351 - 1352

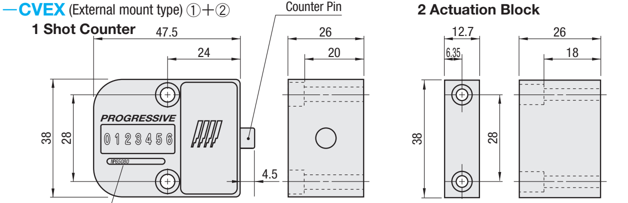
Manufactured by PROGRESSIVE Corporation. Counter View is a trademark of PROGRESSIVE Corporation. PAT. PEND.

①Shot Counter


ID Plates for tool identification

②Actuation Block

M—CVPL (Parting line mount type) only ①
M—CVEX (External mount type) ①+②

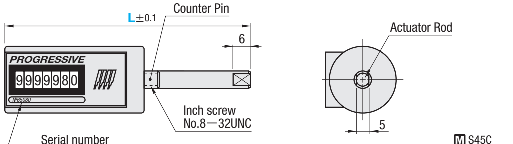

1 Shot Counter
2 Actuation Block
Counter Pin
47.5
24
26
20
38
28
4.5
12.7
6.35
26
18
38
28
Serial number
PROGRESSIVE
0123456

ID Plate design is subject to change without prior notice.

① **M** Glass-filled nylon housing
A Socket Head Cap Screws M4—25 (2 pieces)
ID Plates for tool identification
Maximum operating temperature 120℃

① **M** Steel
A Socket Head Cap Screws M4—25 (2 pieces)

M—CVR (Round type)

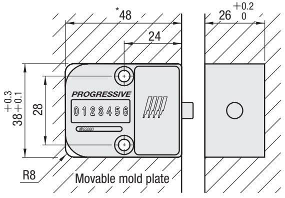

L±0.1
Counter Pin
6
Actuator Rod
Inch screw No.8—32UNC
5
Serial number
PROGRESSIVE
9999980

M Glass-filled nylon housing
Maximum operating temperature 120℃

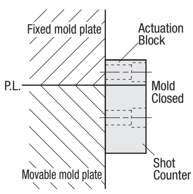
M S45C
A Actuator Rod
S Electroless nickel plated

■Mounting dimensions and method

M—CVPL (Parting line mount type)


*48
24
26 +0.2 0
38+0.1 +0.3
28
R8
Movable mold plate
PROGRESSIVE
0123456

M—CVEX (External mount type)


Fixed mold plate
Actuation Block
P.L.
Mold Closed
Shot Counter
Movable mold plate

(Movable mold plate side chart)

Installation dimension shown in above figure is just for reference purpose.
Stroke distance of the counter pin for counting function is set at 3.75mm or more.
If the stroke is less than 3.75mm, the counter will not work.
Conversely, when the stroke exceeds 4.25mm, the counter may be damaged.

M—CVR

1.Bore the holes for the counter and actuator rod to the dimensions shown in the figure below, from the rear of the movable mold plate.
2.Slot an opening for the display panel of the counter to the dimensions shown in the figure below.
3.Ensure that the actuator rod protrudes 4.0mm above the parting line and decide L dimension depending on the mold plate thickness.
4.Screw the actuator rod into the plunger and insert the counter from the rear of the mold plate.
5.Retain the bottom of the counter with the support plate.

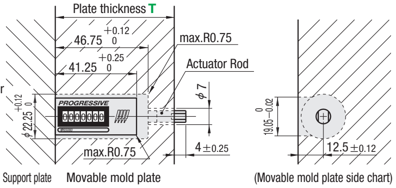


Plate thickness T
46.75 +0.12 0
41.25 +0.25 0
max.R0.75
Actuator Rod
φ7
φ22.25 +0.12 0
19.05 0 −0.02
max.R0.75
4±0.25
12.5±0.12
PROGRESSIVE

Support plate Movable mold plate (Movable mold plate side chart)

Part Number	U/Price 1~9
M—CVPL (only ①)	Quotation

Part Number	U/Price 1~9
M—CVEX (①+②)	Quotation

Part Number	L 0.1mm increments	U/Price 1~9
M—CVR	60.0~124.0	Quotation

■Method of specifying the L dimension

L=Movable mold plate thickness **T**+actuator rod protrusion of 4.0mm
Specify taking into account the tolerance of the mold plate thickness **T**.
The protruding part of the actuator rod is the stroke of the actuator rod. If the stroke is less than 3.75mm, the counter will not work. Conversely, if the stroke exceeds 4.25mm, the counter may be damaged when the mold closes.

■Features

- Counting is actuated mechanically, no miscount will occur if counter is installed correctly.
- Each counter has a different serial number that will be used to identify the counter with the mold. Counters are sold in random order.
- ID Plate for tool identification is included for M-CVPL and M-CVEX only. Apply the adhesive seal at the back of the ID Plate to the front of the counter.

■Notes

The Counter is non-resettable mechanical.
For mold testing purposes, the 7-digit indicator does not start from 0(a value of 9999980 will be shown).
M—CVR Counter: Ensure that the actuator rod has a stroke of 4.0mm±0.25.

Order

Part Number	—	L
M—CVPL M—CVEX M—CVR	—	64.2

Days to Ship Quotation

Price Quotation

M—CVPL, M—CVEX:
CounterView™ Shot Counter is a registered trademark of Progressive Components International Corporation, covered by US Patent No.5,571,539, Canadian Patent No. 2,166,237, European Patent No. EP726129 and Others pending.

M—CVR:
CounterView™ Shot Counter is a registered trademark of Progressive Components International Corporation, covered by US Patent No.5,571,539, Canadian Patent No. 2,166,237, European Patent No. EP726129, S.African Patent No. 2005/5337 and Asia and others pending.

CHEMICAL PRODUCTS

CHEMICAL PRODUCTS

Product Name Part Number	Rust removers —for mold hydro-circuit— RTCC	Rust-prevention agents —For mold hydro-circuit— RST—CC	Lubricants —Grease for precision small diameter ejector pins— GSEPV	Lubricants —Long life grease for ejector pins— LGSEP
	Internet			

Lubricants —Antigall grease for slide cores— HGSSC	Lubricants —Antigall grease for slide cores (for high temperature)— HGSSC—H	Lubricants —Molybdenum disulfide grease for initial running-in grease— GSMOS	Lubricants —Spray type for hot spot— HSL—SP	Lubricants —Extra heat-resistant grease— GGPBC
		Internet		

Lubricants —Grease for O-ring— GSORG	Detergents Special detergent —For grease for precision small diameter ejector pins— CLN—GSEPV	Special detergent —For antigall grease for slide cores— CLN—HGSSC	Special detergent —For long life grease for ejector pins— CLN—LGSEP	Special detergent —For molybdenum disulfide grease for initial running-in grease— CLN—GSMOS
		Internet		

Detergents —Quick-drying spray type for mold— CAVCLN	Detergents —Powerful liquid type for soaking— SGW	Detergents —Paste type for removing gas burn— GRVPST	Detergents —Gas spray type for removing gas and burned resin— GRVSP	Rust Removers —Spray type— RTSP
		Internet		

Rust Removers —Powerful liquid type for soaking— CPRSTR	Rust-prevention Agent —Standby (releasing possible) type— RST—DRY	Rust-prevention Agents —Gasification type— RST—VP	Rust-prevention Agents —Spray type for mold maintenance— MLDPRO	Rust-prevention Agents —Powerful liquid type for soaking— RUSTON
		Internet		

Maintenance oil for plastic molds MLDOIL	Burning prevention spray for insulator sheet COTHIP	Grease for heat transaction pipe MTJ	Lubricant burning-prevention agents for cartridge heaters HTLB	Adhesives for mold LOC638 LOC242	Normal quick-drying detergent 6PACK—METACL
			Internet		

Internet catalog is not available in some subsidiaries.

■Instructions for Chemical Products

Lub ricants

■Grease for Precision Small Diameter Ejector Pins

GSEPV

Prewash grime, rust-prevention agent and metal shavings from the pin using **CAVCLN**.
Then use the soaking detergent **SGW** do soak the pin and sufficiently remove oil, before drying it.
Place a small amount of this product on a nonwoven cloth and spread it by rubbing against the metal surface, until there is no more white color on the surface is enough.

Take care not to touch any foreign objects while assembling the mold.
If there is still grease present due to the reapplication during maintenance, conduct the prewashing and soaking twice to completely remove any attached particles before applying the product.

■Antigall Grease for Slide Cores (for high temperature)

HGSSC—H

Remove the lubricants and grease completely by **CAVCLN**. After**CAVCLN** dries enough, paint this product using a brush. Use the grease after completely wiping off the grease leak by a rag or unwoven cloth containing **CAVCLN**.

■Extra Heat-Resistant Grease

GGPBC

Use **CAVCLN** to remove oil where the product is to be applied.
Place a small amount of this product on a brush and spread it by rubbing against the metal surface.
Wipe off any protruding areas with a rag containing **CAVCLN**.
To completely remove the coating for maintenance, soak in late-drying cleaning liquid and wait for the coating to loosen before finishing the cleaning with **SGW** and rinsing with water.
Take care as over-application can reduce the lubrication effect and lead to oil leakage.

■Long Life Grease for Ejector Pins

LGSEP

Use **CAVCLN** to remove oil where the product is to be applied.
Apply a small amount of the product to metal surfaces that slide together and fill grease cavities, then spread the product around the sliding surfaces by rubbing with an unwoven cloth.
Wipe off any protruding areas with a rag containing **CAVCLN**.
To completely remove the coating for maintenance, soak in late-drying cleaning liquid and wait for the coating to loosen before finishing the cleaning with **SGW** and rinsing with water.
There is no oil leakage so this can be used near the manufactured product area.
It can be removed from the molded product without effect by using **CAVCLN**.

■Molybdenum Disulfide Grease for Initial Running-in Grease

GSMOS

Remove the lubricants and rust-prevention agents completely by **CAVCLN**.
After **CAVCLN** dries enough, paint this product using a brush. Use the grease after completely wiping off the grease leak by a rag or unwoven cloth containing **CAVCLN**.

■Grease for O-ring

GSORG

Clean the O-ring with **CAVCLN** to remove any dirt, grime or oil then dry it.
Take this product on the tip of a finger, and apply on O-ring uniformly and thinly.
Carefully attach it to avoid dirt adhering.
When fitting an O-ring to a part with an edge, do so by applying a small amount of this product to the part.
After the O-ring has been fitted, remove any extra protruding grease by using **CAVCLN**.

■Antigall Grease for Slide Cores

HGSSC

Use **CAVCLN** to remove oil where the product is to be applied.
Apply it in the same manner as normal grease.
Rub it into both surfaces where abrasion is expected to occur.
Wipe off any protruding areas with a rag containing **CAVCLN**.
Removal of the coating is done using **MLDPRO** for loosening and **CAVCLN** for finishing the cleaning.
Use **CAVCLN**, which does not damage rubber, for cleaning areas where a seal is used, such as in a hydraulic cylinder.

■Spray Type for Hot Spot

HSL—SP

Spray directly on the molding mold components. Resume molding again after the solvent dried enough. Wipe off by a rag or a non-woven cloth containing detergent if it adherents to the part that comes in contact with the molding goods.

Detergents

■Special detergent -For Grease for Precision Small Diameter Ejector Pins-

CLN—GSEPV

Wipe off with rag containing this product. If grease is solidified or carbonized, soak the product in this liquid or wrap and soften the clung part with paper rag moistened by this product.

■Special detergent -For Molybdenum Disulfide Grease for Initial Running-in Grease-

CLN—GSMOS

Dilute the liquid with water to 30 times and soak the components or molds in it. Improve the cleaning effect by combining with ultrasonic washing machine.
Rinse with water until no foam generates.

■Paste Type for Removing Gas Burn

GRVPST

Remove oil, mold release agent and resin attached to the surface using **CAVCLN** or this product.
Paste a fair amount of this product on the burnt resin sections and leave for 5 minutes.
Rub off the burnt marks with a lapping stick.
Wipe off once and if there is still any burnt mark on the metal part, polish these off with rag containing a small amount of this product.

■Special detergent -For Antigall Grease for Slide Cores-

CLN—HGSSC

Dilute this item to 10 times with water or hot water and soak the components in it. The grease will separate from the metal surface by shaking the component after soaking about 10 minutes. After confirming the grease's coming off, take the component out and wash it by water.

■Quick-Drying Spray Type for Mold

CAVCLN

This is a quick drying spray detergent that is able to clean the forming surface of molds, lubrication inlets and electrical terminals (connectors, terminals)
It can be used to clean dirt and oil from all places around the mold (extraction devices, cylinder shafts, mold locks, etc.) without damaging resin or rubber products (packing, O-rings).

■Spray Type for Removing Gas and Burned Resin

GRVSP

Spray this product evenly around the adhesion thing of the mold. Place it for about five minutes to make the solution infiltrates enough. If the adhesion thing is few, it can be removed only by several shots. If the adhesion articles sticks, scrape it with a soft brush or a nonwoven cloth. If the stain is deep, flush the grain surface with **CAVCLN** after using this product.

■Special detergent -For Long Life Grease for Ejector Pins-

CLN—LGSEP

Wipe off with rag containing this product. When grease has clung, soak it in this product until loosened and wipe it off.

■Powerful Liquid Type for Soaking

SGW

Depending on the level of dirtiness, dilute with water for soaking, and rinse off this product with water
Molds can be cleaned by soaking without packing or O-rings being damaged.
Take care when completely cleaning molds that are expected to contain gas buildup.
This also allows the removal of static electricity dust attached to a molded product (plastic product)

Rust Removers

■Spray Type

RTSP

This can be used for partial or light rust removal during maintenance.
When the section of rust is sprayed, the rust is contained in foam, and only the rust undergoes chemical decomposition.
After the rust is removed, properly carry out anti-corrosion using **RUSTON**.

■For Mold Hydro-Circuit

RTCC

Enables easy removal of red rust generated inside the mold cooling circuit.
The rust of cooling circuit can be removed without using large machine or equipment. Dust cannot be completely prevented by washing only, so carry out antirust treatment after rust removal.

■Powerful Liquid Type for Soaking

CPRSTR

This can be used for overall rust removal of the work during maintenance.
It can be used to remove rust from the work and electrodes after wire cutting.
After the rust is removed, properly carry out anti-corrosion using **RUSTON**, which is the same as we do for **RTSP**.

Rust-prevention Agents

■Standby (Discarding Possible) Type

RST—DRY

Clean the product or mold by **CAVCLN** and make it dry. Spray it uniformly from the distance of about 30cm. Move to the store place after about 15 minutes until the coating dries enough.

■Spray Type for Mold Maintenance

MLDPRO

This is a special chemical (lubricant and rust-prevention agent) that is useful for mold processing and maintenance.
When processing mold parts, it removes chips and abrasives, lubricates abrasive sticks, removes water from parts, lubricates the insertion of bushing, loosens tight screws, removes light rust, cleans grease and tar, act as an rust-prevention agent, lubricates the machine, is used as a lubricant, and can also be used as a condensation remover and rust-prevention agent in forming a mold.

■For Mold Hydro-Circuit

RST—CC

Use for anti-rust treatment after removing rust with rust remover (RTCC).

■Gasification Type

RST—VP

Spray this product evenly after washing it by **CAVCLN** and making it dry enough. The effect of rust prevention continues if the mold remains closed and forming surface is wrapped by vinyl cover after being applied.

■Powerful Liquid Type for Soaking

RUSTON

Concentrate of this product can be used for soaking, dipping and spraying.
After soaking the entire surface of a metal part, remove any drips and wrap in vinyl.
Soaking mold components in concentrate of this product for long period does not make the components rust.

Others

■Maintenance Oil for Plastic Molds

MLDOIL

Apply on the metal surface properly. An osmosis membrane comes into being on the metal surface, if it is applied after the groundwork is carefully cleaned, which make the long-term effect of lubrication and rust-prevention even in oil-free state.

■Lubricant Burning-prevention Agents Cartridge for Heaters

HTLB

Insert into the mold after 15～20 minutes of application on cartridge heater.

■Burning Prevention Spray for Insulator Sheet

COTHIP

Use an air blower to remove powder attached to the insulation sheeting surface in advance.
Completely remove all grime, oil and moisture, and completely dry the insulation sheeting.
Shake the spray can well to spread the contents evenly.
Hold 20cm away from the insulation sheeting and apply a light spray.
The coating will dry after being left for around 30 minutes.
Check that the solvent odor has dissipated before fitting to the mold.

■Adhesives for mold

LOC638・LOC243

Generally adhere to single side of 0.01～0.03mm for press-fit of mold components. When Loctite is applied, we recommend performing degreasing process on **6PACK—METACL**, etc.

■Grease for Heat Transaction Pipe

MTJ

Wipe off by a rag or a nonwoven cloth containing detergent if it adherents to the part that comes in contact with the molding goods.

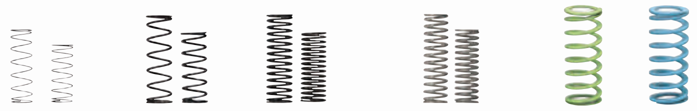
■Middle Quick-drying Detergent

6PACK—METACL

It can be used in cleaning the metal parts and mold or removing the oil or grease. It becomes dry in about 10 seconds and is safe for human body.

SPRINGS

SPRINGS



Product Name Part Number	Wire Springs WY WR WF WL WT WM WH WB	−Internal diameter standard type− NWL NWM	−Long type− WP	Heat Proof Wire Springs WFH WLH WMH WHH	Heat Proof Coil Springs SWY	SWU
Page	1221～1229	1230	1230	1231～1234	1235	1236

Coil springs									
SWR	SWS	SWN	SWC	SWF	SWL	SWM	SWH	SWB	SWG
1237	1239	1241	1243	1245	1247	1249	1251	1253	1255

Gate-cut Springs WSW WSV	Coil Spring Washers SSWA SSWB SSWC	Spring Guide Pins SGAMK SGA	Gas Springs for Plastic Mold MBPGS−A MBPGS−B	Holders for Gas Spring MBPGS−H
1259	1260	1261 1262	1267	1268

Category	Characteristics	Page	Type		Outer Diameter		Overall Length		Allowable Deflection	Load N{kgf}	
			Part Number	Color	min.	max.	min.	max.		min.	max.
Wire Springs	• Designed to have a consistent spring constant against the diameter. (Load varies depending on the overall length.)	P.1222	WY	—	ϕ3	ϕ16	5	70	75% (1 million shots)	0.38 {0.04}	10.3 {1.05}
		P.1223	WR	—	ϕ3	ϕ27	5	90	60% (1 million shots)	0.9 {0.09}	23.5 {2.4}
		P.1224	WF	—	ϕ3	ϕ27	5	90	45% (1 million shots)	1.1 {0.11}	35.3 {3.6}
		P.1225	WL	—	ϕ2	ϕ27	5	100	40% (1 million shots)	0.98 {0.1}	117.7 {12.0}
		P.1226	WT	—	ϕ3	ϕ27	5	80	40% (1 million shots)	2.9 {0.3}	125.5 {12.8}
		P.1227	WM	—	ϕ3	ϕ27	5	100	35% (1 million shots)	3.4 {0.4}	171.6 {17.5}
		P.1228	WH	—	ϕ4	ϕ27	5	100	30% (1 million shots)	4.9 {0.5}	441.3 {45.0}
		P.1229	WB	—	ϕ3	ϕ27	5	100	25% (1 million shots)	4.9 {0.5}	735.5 {75.0}
		P.1230	NWL (Inner dia. st.)	—	ϕ5.5 (Inner dia.)	ϕ16.6 (Inner dia.)	30	60	40% (1 million shots)	13.7 {1.4}	27.5 {2.8}
		P.1230	NWM (Inner dia. st.)	—	ϕ5.5 (Inner dia.)	ϕ16.6 (Inner dia.)	30	60	32% (1 million shots)	20.6 {2.1}	34.3 {3.5}
		P.1230	WP (Long type)	—	ϕ11.5	ϕ17	100	500	70% (1 million shots)	21.3 {2.2}	34.3 {3.5}

●Temperature to be used

Data shown in the catalog on load, etc are based on measurements made at room temperature (40℃ or less), and depending on various conditions, use at temperatures above room temperature may lead to a reduction in load and the number of cycles for durability.
The products are to be used in temperatures of 80℃ or less. The heat resistance temperature (round wire: 120℃, irregular wire: 200℃) for springs is higher that the temperatures for use, but a great reduction in functionality is expected at temperatures above the temperatures for use. Except Stainless type (P.1263)
For the maximum allowable deflection of a heatproof spring at high temperature, see the table on the page at right.

●Coil spring painting

MISUMI coil springs are painted for identification and to prevent corrosion.
Possible to peel the paint by alteration(excluding round wire). (P.1257)

●Allowable deflection

Do not use with a greater deflection than the maximum valueor load and durability will be reduced, and may result in breakage.
If round wire coil springs have even a single stroke larger than the maximum deflection, the L dimension is reduced.

●Calculation of spring load

Load=spring constant×deflection
N=N/mm × Fmm (international units)
kgf=kgf/mm × Fmm
(kgf=N×0.101972)

Category		Characteristics	Page	Type		Outer Diameter		Overall Length		Allowable Deflection			Load N{kgf}	
				Part Number	Color	min.	max.	min.	max.	Room Temperature Used	150℃ Used	200℃ Used	min.	max.
Heat-proof Springs	Wire Springs	• Designed to have a consistent spring constant against the diameter. (Load varies depending on the overall length.) • Operating temperature limit 200℃	P.1231	WFH	—	ϕ4	ϕ18	5	100	60% (1 million shots)	54% (1 million shots)	48% (1 million shots)	1.5 {0.15}	58.8 {6.0}
			P.1232	WLH	—	ϕ4	ϕ18	5	100	50% (1 million shots)	45% (1 million shots)	40% (1 million shots)	2.5 {0.25}	147.1 {15.0}
			P.1233	WMH	—	ϕ4	ϕ18	5	100	40% (1 million shots)	36% (1 million shots)	32% (1 million shots)	3.9 {0.4}	196.1 {20.0}
			P.1234	WHH	—	ϕ4	ϕ18	5	100	35% (1 million shots)	32% (1 million shots)	28% (1 million shots)	5 {0.5}	514.8 {52.5}
	Irregular Wire Springs	• For high deflection • Designed to have a consistent spring constant against the diameter. • Operating temperature limit 200℃	P.1235	SWY (Ultra high deflection)	Pastel green 🟢	ϕ11	ϕ42	20	300	65% (1 million shots) 70% (300,000 shots)	52% (1 million shots) 56% (300,000 shots)	46% (1 million shots) 49% (300,000 shots)	29.4 {3.0} 31.4 {3.2}	392.3 {40.0} 425.6 {43.4}
			P.1236	SWU (Super high deflection)	Light blue 🔵	ϕ10.5	ϕ43	15	300	60% (1 million shots) 65% (300,000 shots)	48% (1 million shots) 52% (300,000 shots)	42% (1 million shots) 46% (300,000 shots)	68.6 {7.0} 73.9 {7.5}	588.4 {60.0} 637.4 {65.0}
			P.1237	SWR (High deflection)	Ivory ●	ϕ10.5	ϕ50	15	400	50% (1 million shots) 55% (300,000 shots)	40% (1 million shots) 44% (300,000 shots)	35% (1 million shots) 39% (300,000 shots)	78.5 {8.0} 87.2 {8.8}	1323.9 {135.0} 1456.3 {148.5}
			P.1239	SWS (Medium deflection)	Orange ●	ϕ10.5	ϕ52	20	300	40% (1 million shots) 45% (300,000 shots)	32% (1 million shots) 36% (300,000 shots)	28% (1 million shots) 32% (300,000 shots)	87.2 {8.8} 97.1 {9.9}	1569.1 {160.0} 1765.2 {180.0}
			P.1241	SWN (Low deflection)	Dark brown ●	ϕ14.5	ϕ37	20	300	30% (1 million shots) 35% (300,000 shots)	25% (1 million shots) 30% (300,000 shots)	20% (1 million shots) 25% (300,000 shots)	274.6 {28.0} 304.0 {31.0}	882.6 {90.0} 980.7 {100.0}

Category		Characteristics	Page	Type		Diameter Outer (Inner)		Overall Length		Allowable Deflection	Load N{kgf}	
				Part Number	Color	min.	max.	min.	max.		min.	max.
Irregular Wire Springs	For heavy load	• Designed to have a consistent spring constant against the diameter.	P.1243	SWC (Extra minimal load)	Purple ●	ϕ6 (ϕ3)	ϕ30 (ϕ15)	15	200	50% (1 million shots) 60% (300,000 shots)	27 {2.8} 32 {3.3}	392 {40.0} 471 {48.0}
			P.1245	SWF (Minimal load)	Yellow 🟡	ϕ6 (ϕ3)	ϕ70 (ϕ38.5)	10	500	40% (1 million shots) 50% (300,000 shots)	47 {4.8} 59 {6.0}	3136 {320} 3920 {400}
			P.1247	SWL (Light load)	Blue 🔵	ϕ6 (ϕ3)	ϕ70 (ϕ38.5)	10	350	32% (1 million shots) 40% (300,000 shots)	63 {6.4} 78 {8.0}	4782 {488} 5978 {610}
			P.1249	SWM (Medium load)	Red ●	ϕ6 (ϕ3)	ϕ70 (ϕ38.5)	10	350	25.6% (1 million shots) 32% (300,000 shots)	78 {8.0} 98 {10}	6664 {680} 8330 {850}
			P.1251	SWH (Heavy load)	Green ●	ϕ6 (ϕ3)	ϕ70 (ϕ38.5)	10	350	19.2% (1 million shots) 24% (300,000 shots)	110 {11} 137 {14}	10046 {1024} 12557 {1280}
			P.1253	SWB (Extra heavy load)	Brown ●	ϕ6 (ϕ3)	ϕ70 (ϕ38.5)	10	350	16% (1 million shots) 20% (300,000 shots)	142 {14} 177 {18}	13655 {1392} 17069 {1740}
			P.1255	SWG (Hyper heavy load)	Black ●	ϕ10 (ϕ 5)	ϕ50 (ϕ25)	15	200	16% (1 million shots) 20% (300,000 shots)	392 {40} 490 {50}	9807 {1000} 12258 {1250}

[TECHNICAL DATA]INSTRUCTIONS AND NOTES FOR COIL SPRINGS

■Instructions and notes for coil springs

MISUMI coil springs (excluding wire springs) are constantly undergoing design of optimal crossectional form in an effort to improve durability. Take great care of the notes below in order to use it as ease.

① Always use with a spring guide

When used without a spring guide, the coil spring may buckle or bend midway. This can cause it to break since the internal surface of the bend is subjected to concentrated high stress. Be sure to use a spring guide, such as a shaft and OD(outside diameter)guide, with the coil spring.

※The best results are obtained by inserting a shaft all the way through the coil spring, from top to bottom, as an ID (inside diameter) guide.

② Clearance between spring ID and shaft

It is recommended that the shaft diameter be set approximately 1.0 mm smaller than the ID of the coil spring. When clearance between the spring and the shaft is insufficient, the coil springs internal surface may come into contact with the shaft and be subject to abrasion at that point. This will lead to the spring eventually breaking at the point of wear. Excessive clearance, on the other hand, can lead to buckling of the coil spring.

When the coil spring has a long free length (i.e., free length／OD is 4 or higher), set up a step on the shaft as shown in Fig. 1 to prevent the coil spring's internal surface from touching the shaft when it bends.

③ Clearance between spring OD and spotfaced hole

It is recommended that the spotfaced hole diameter be set approximately 1.5 mm larger than the coil spring OD. The coil spring expands in the outward direction when it deflects. Insufficient clearance between the spring and the spotfaced hole restrains expansion, and the resulting concentration of stress can cause the coil spring to break. The spotfaced hole configuration shown in Fig. 1 is ideal for a coil spring with a long free length.

④ Avoid a short shaft length and shallow spotfaced hole depth

If the guide is too short, the coil spring may touch the guides tip when it is compressed. The resulting friction could cause the coil spring to break. It is recommended that the guide length be set longer than half of the initial height. Also make sure to chamfer the shaft to around C3 level.

⑤ Do not use in excess of maximum deflection(300,000-times limit)(or use near solid height)

When the coil spring is used in excess of the 300,000-times limit, the cross section begins to receive a stress higher than the theoretical value. This will cause the coil spring to break. And when the coil spring is used at around its solid height its active coils gradually adhere each other, increasing the spring constant value and causing the load curve to rise, as shown in Fig. 2. The resulting high stress that develops will cause the coil spring to break. Avoid using in conditions of over 300,000 cycles.

⑥ Set up an initial deflection

When there is room for the coil spring to move vertically, it receives an impact force that causes it to bend midway or to buckle. Setting up an initial deflection stabilizes the top and bottom ends of the spring.

⑦ Avoid entrapment of debris or foreign matter

Debris or foreign matter that gets caught between the coils causes that part of the coil spring to stop functioning as active coils, making the other coils deflect as shown in Fig. 3. This effectively reduces the number of active coils, increasing the stress on the spring, and causing it eventually to break. Be careful not to let debris or foreign matter foul the coils.

⑧ Keep mounting faces parallel

The coil spring should be mounted properly, with its mounting faces (top and bottom faces) parallel to each other. Misalignment can cause the spring to bend midway, subjecting the bend to high stress.This can cause to spring to break at that point. The same applies to the dies in which the coil spring is used, if the parallel alignment between the dies is poor, as shown in Fig. 4, the coil spring can bend midway or exceed the 300,000-times limit prematurely. Keep the coil springs mounting faces as perfectly parallel as possible to prevent this from occurring.

⑨ Do not use coil springs in series

If you use two coil springs in series, they will tend to bend, as shown in Fig. 5. This can cause them to move out of the shaft or spotfaced holes. If this happens, the coil spring will eventually break for the same reasons described in①above. Due to spring load differences, moreover, the weaker spring is overcome by (and deflects more than) the stronger spring, as shown in Fig. 6. This will make the weaker spring more prone to damage, or cause it to break. Moreover, each spring constant when placing 2 springs in series is 1/2 that of a single spring.

⑩ Do not use two coil springs in parallel

Use of two coil springs in parallel may result in the inner coils being sandwiched between the outer coils, or vice versa, when they contract as shown in Fig.7. This can cause the coil springs to break for the same reason noted in ④.

⑪ Do not use the coil spring horizontally

When the coil spring is used horizontally, the internal surface of the spring will come into contact with the shaft, causing abrasion at those spots. The spring will eventually break at these weakened spots.

MISUMI endurance test conditions

① **Spring guide formula**
Shaft penetration:
1.0 mm less than shaft diameter d

② **Initial deflection**
1.0mm

③ **Amplitude**
Deflection with 300,000-times limit value

④ **Speed**
180spm

※The maximum number of durable operating times may vary depending on the service conditions.

Fig. 1

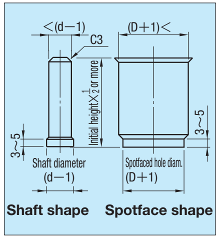


Fig. 2

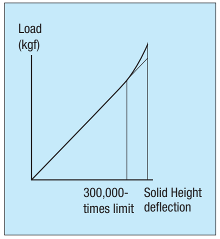


Fig. 3

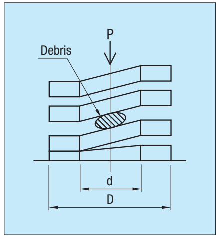


Fig. 4

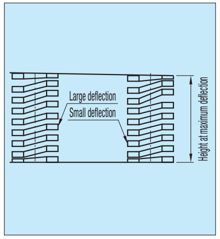


Fig. 5

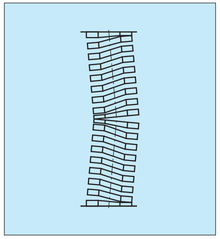


Fig. 6

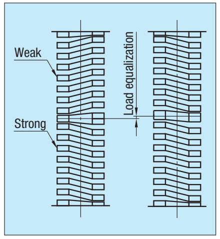
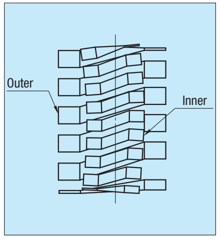


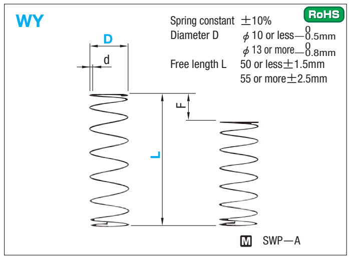
Fig. 7



WIRE SPRINGS

—WY (75% DEFLECTION)—

WY



RoHS

Spring constant ±10%
Diameter D ϕ10 or less $^{\ \ 0}_{-0.5}$mm
ϕ13 or more $^{\ \ 0}_{-0.8}$mm
Free length L 50 or less±1.5mm
55 or more±2.5mm

Order: **Part Number** WY13—60

Days to Ship: Quotation

Price: Quotation

■Spring constant

D12/14 not available for WY.

D \ Type	WY	WR	WF	WL	WT	WM	WH	WB
2								
3				0.5{0.05}				
4	N/mm 0.1 {kgf/mm} {0.01}	N/mm 0.3 {kgf/mm} {0.03}	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	1.5 {0.15}	2.0 {0.2}		3.9{0.4}
5							2.9{0.3}	4.9{0.5}
6					N/mm 2.0 {kgf/mm} {0.2}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}	N/mm 9.8 {kgf/mm} {1.0}
8								
10	N/mm 0.2 {kgf/mm} {0.02}							
12								
13							N/mm 9.8 {kgf/mm} {1.0}	N/mm 19.6 {kgf/mm} {2.0}
14								
16								
18		N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 3.9 {kgf/mm} {0.4}	N/mm 4.9 {kgf/mm} {0.5}	N/mm 14.7 {kgf/mm} {1.5}	29.4{3.0}
20								
22								29.4 {3.0}
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

■WY:Fmax.(allowable deflection)=L×75%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.16	1.0	3.75	0.38{0.04}	WY 3— 5	Quotation
0.2	2.0	7.5	0.75{0.08}	10	
0.23	3.6	11.2	1.12{0.11}	15	
0.23	3.6	15	1.5 {0.15}	20	
0.25	5.5	18.7	1.87{0.19}	25	
0.26	6.5	22.5	2.25{0.23}	30	
0.2	1.1	3.75	0.38{0.04}	WY 4— 5	
0.23	1.9	7.5	0.7 {0.08}	10	
0.23	1.9	11.2	1.1 {0.11}	15	
0.25	2.7	15	1.5 {0.15}	20	
0.29	5	18.7	1.8 {0.19}	25	
0.29	5	22.5	2.2 {0.23}	30	
0.32	7.7	26.2	2.6 {0.26}	35	
0.32	7.7	30	2.9 {0.3 }	40	
0.25	1.7	7.5	0.7 {0.08}	WY 5—10	
0.25	1.7	11.2	1.1 {0.11}	15	
0.3	3.2	15	1.5 {0.15}	20	
0.3	3.2	18.7	1.8 {0.19}	25	
0.35	6.3	22.5	2.2 {0.23}	30	
0.35	6.3	26.2	2.6 {0.26}	35	
0.38	9.2	30	2.9 {0.3 }	40	
0.38	9.2	33.7	3.3 {0.34}	45	
0.38	9.2	37.5	3.7 {0.38}	50	
0.3	2.1	7.5	0.75{0.08}	WY 6—10	
0.32	2.8	11.2	1.1 {0.11}	15	
0.32	2.8	15	1.5 {0.15}	20	
0.35	4.1	18.7	1.8 {0.19}	25	
0.38	5.6	22.5	2.2 {0.23}	30	
0.38	5.6	26.2	2.6 {0.26}	35	
0.4	7.2	30	2.9 {0.3 }	40	
0.4	7.2	33.7	3.3 {0.34}	45	
0.4	7.2	37.5	3.7 {0.38}	50	
0.45	12.2	41.2	4.0 {0.41}	55	
0.45	12.2	45	4.4 {0.45}	60	
0.45	12.2	48.7	4.8 {0.49}	65	
0.45	12.2	52.5	5.1 {0.53}	70	
0.35	2.1	7.5	0.75{0.08}	WY 8—10	Quotation
0.38	3	11.2	1.1 {0.11}	15	
0.4	3.5	15	1.5 {0.15}	20	
0.4	3.5	18.7	1.8 {0.19}	25	
0.45	5.7	22.5	2.2 {0.23}	30	
0.45	5.7	26.2	2.6 {0.26}	35	
0.45	5.7	30	2.9 {0.3 }	40	
0.45	5.7	33.7	3.3 {0.34}	45	
0.5	9	37.5	3.7 {0.38}	50	
0.5	9	41.2	4.0 {0.41}	55	
0.5	9	45	4.4 {0.45}	60	
0.5	9	48.7	4.8 {0.49}	65	
0.5	9	52.5	5.1 {0.53}	70	
0.5	3	11.2	2.26{0.23}	WY10—15	
0.55	4.6	15	2.9 {0.3 }	20	
0.55	4.6	18.7	3.7 {0.37}	25	
0.6	6.6	22.5	4.4 {0.45}	30	
0.6	6.6	26.2	5.1 {0.52}	35	
0.65	9.1	30	5.9 {0.6 }	40	
0.65	9.1	33.7	6.6 {0.67}	45	
0.65	9.1	37.5	7.4 {0.75}	50	
0.7	12.6	41.2	8.1 {0.82}	55	
0.7	12.6	45	8.8 {0.9 }	60	
0.7	12.6	48.7	9.6 {0.97}	65	
0.7	12.6	52.5	10.3 {1.05}	70	
0.6	3.9	15	2.9{0.3 }	WY13—20	Quotation
0.65	5.1	18.7	3.7{0.37}	25	
0.65	5.1	22.5	4.4{0.45}	30	
0.7	6.7	26.2	5.1{0.52}	35	
0.75	8.7	30	5.9{0.6 }	40	
0.75	8.7	33.7	6.6{0.67}	45	
0.8	11.6	37.5	7.4{0.75}	50	
0.8	11.6	41.2	8.1{0.82}	55	
0.8	11.6	45	8.8{0.9 }	60	
0.85	15.3	48.7	9.6{0.97}	65	
0.85	15.3	52.5	10.3{1.05}	70	
0.65	3.6	15	2.9{0.3 }	WY16—20	
0.7	4.6	18.7	3.7{0.37}	25	
0.75	5.7	22.5	4.4{0.45}	30	
0.8	7	26.2	5.1{0.52}	35	
0.85	9	30	5.9{0.6 }	40	
0.85	9	33.7	6.6{0.67}	45	
0.9	11.3	37.5	7.4{0.75}	50	
0.9	11.3	41.2	8.1{0.82}	55	
0.9	11.3	45	8.8{0.9 }	60	
0.9	11.3	48.7	9.6{0.97}	65	
0.9	11.3	52.5	10.3{1.05}	70	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- No grinding on both ends of all WY type springs.
- The solid height values are for reference only.
  There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide P.1219
- Instructions and notes for coil springs P.1221

WIRE SPRINGS

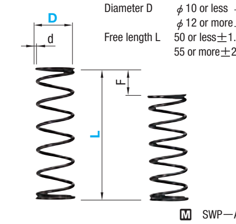
—WR (60% DEFLECTION) • WF (45% DEFLECTION)—

Order	Part Number	Days to Ship	Price
	WR13—60	Quotation	Quotation

WR
WF

Spring constant ±10%
Diameter D ϕ10 or less $^{0}_{-0.5}$mm
ϕ12 or more $^{0}_{-0.8}$mm
Free length L 50 or less±1.5mm
55 or more±2.5mm

RoHS



M SWP—A

■Spring constant

D \ Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5{0.05}				
3	N/mm 0.1 {kgf/mm} {0.01}	N/mm 0.3 {kgf/mm} {0.03}	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	1.5 {0.15}	2.0 {0.2}		3.9{0.4}
4							2.9{0.3}	4.9{0.5}
5					N/mm 2.0 {kgf/mm} {0.2}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}	N/mm 9.8 {kgf/mm} {1.0}
6								
8								
10	N/mm 0.2 {kgf/mm} {0.02}							
12								
13							N/mm 9.8 {kgf/mm} {1.0}	N/mm 19.6 {kgf/mm} {2.0}
14								
16								
18		N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 3.9 {kgf/mm} {0.4}	N/mm 4.9 {kgf/mm} {0.5}	N/mm 14.7 {kgf/mm} {1.5}	29.4{3.0}
20								29.4 {3.0}
22								
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

■WR:Fmax.(allowable deflection)=L×60%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.23	1.8	3	0.9{0.09}	WR 3— 5	Quotation
0.25	2.3	6	1.8{0.18}	10	
0.3	4.8	9	2.6{0.27}	15	
0.3	4.8	12	3.5{0.36}	20	
0.32	6.8	15	4.4{0.45}	25	
0.32	6.8	18	5.3{0.54}	30	
0.35	11.5	21	6.2{0.63}	35	
0.35	11.5	24	7.1{0.72}	40	
0.26	1.6	3	0.9{0.09}	WR 4— 5	
0.29	2.2	6	1.8{0.18}	10	
0.32	3.2	9	2.6{0.27}	15	
0.38	6.5	12	3.5{0.36}	20	
0.38	6.5	15	4.4{0.45}	25	
0.4	8.4	18	5.3{0.54}	30	
0.4	8.4	21	6.2{0.63}	35	
0.45	15	24	7.1{0.72}	40	
0.45	15	27	7.9{0.81}	45	
0.45	15	30	8.8{0.9}	50	
0.45	15	33	9.7{0.99}	55	
0.5	23.5	36	10.6{1.08}	60	
0.5	25	39	11.5{1.17}	65	
0.5	25	42	12.4{1.26}	70	
0.3	1.6	3	0.9{0.09}	WR 5— 5	
0.35	1.6	6	1.8{0.18}	10	
0.35	2.8	9	2.6{0.27}	15	
0.4	4.8	12	3.5{0.36}	20	
0.45	8	15	4.4{0.45}	25	
0.45	8	18	5.3{0.54}	30	
0.5	12.5	21	6.2{0.63}	35	
0.5	12.5	24	7.1{0.72}	40	
0.55	17.6	27	7.9{0.81}	45	
0.55	18	30	8.8{0.9}	50	
0.55	20	33	9.7{0.99}	55	
0.55	20	36	10.6{1.08}	60	
0.55	20.9	39	11.5{1.2}	65	
0.55	20.9	42	12.4{1.3}	70	
0.32	1.6	3	0.9{0.09}	WR 6— 5	
0.4	3.2	6	1.8{0.18}	10	
0.4	3.2	9	2.6{0.27}	15	
0.5	7.5	12	3.5{0.36}	20	
0.5	7.5	15	4.4{0.45}	25	
0.5	7.5	18	5.3{0.54}	30	
0.55	11.5	21	6.2{0.63}	35	
0.55	11.5	24	7.1{0.72}	40	
0.6	17.4	27	7.9{0.81}	45	
0.6	17.4	30	8.8{0.9}	50	
0.6	17.4	33	9.7{0.99}	55	
0.6	17.4	36	10.6{1.08}	60	
0.6	17.4	39	11.5{1.17}	65	
0.6	17.4	42	12.4{1.26}	70	
0.65	27.3	48	14.1{1.4}	80	
0.45	2.7	6	1.8{0.18}	WR 8—10	
0.5	4	9	2.6{0.27}	15	
0.5	4	12	3.5{0.36}	20	
0.55	5.8	15	4.4{0.45}	25	
0.6	8.4	18	5.3{0.54}	30	
0.6	8.4	21	6.2{0.63}	35	
0.6	8.4	24	7.1{0.72}	40	
0.7	16	27	7.9{0.81}	45	
0.7	16	30	8.8{0.9}	50	
0.7	16	33	9.7{0.99}	55	
0.7	16	36	10.6{1.08}	60	
0.7	16	39	11.5{1.17}	65	
0.7	16	42	12.4{1.26}	70	
0.75	22.9	48	14.1{1.4}	80	
0.55	3.6	6	1.8{0.18}	WR10—10	
0.6	4.8	9	2.6{0.27}	15	
0.65	6.5	12	3.5{0.36}	20	
0.65	6.5	15	4.4{0.45}	25	
0.7	8.8	18	5.3{0.54}	30	
0.7	8.8	21	6.2{0.63}	35	
0.7	8.8	24	7.1{0.72}	40	
0.8	16	27	7.9{0.81}	45	
0.8	16	30	8.8{0.9}	50	
0.8	16	33	9.7{0.99}	55	
0.85	21	36	10.6{1.08}	60	
0.85	21	39	11.5{1.17}	65	
0.85	21	42	12.4{1.26}	70	
0.9	28.8	48	14.1{1.4}	80	
0.6	3.6	6	1.8{0.18}	WR12—10	
0.65	4.6	9	2.6{0.27}	15	
0.65	4.6	12	3.5{0.36}	20	
0.7	6	15	4.4{0.45}	25	
0.7	6	18	5.3{0.54}	30	
0.7	6	21	6.2{0.63}	35	
0.8	10.4	24	7.1{0.72}	40	
0.8	10.4	27	7.9{0.81}	45	
0.9	17.1	30	8.8{0.9}	50	
0.9	17.1	33	9.7{0.99}	55	
0.9	17.1	36	10.6{1.08}	60	
0.9	17.1	39	11.5{1.17}	65	
0.9	17.1	42	12.4{1.26}	70	
1.0	28	48	14.1{1.4}	80	
0.6	3.2	6	1.8{0.18}	WR13—10	
0.7	4.9	9	2.6{0.27}	15	
0.7	4.9	12	3.5{0.36}	20	
0.8	8.4	15	4.4{0.45}	25	
0.8	8.4	18	5.3{0.54}	30	
0.8	8.4	21	6.2{0.63}	35	
0.9	13.5	24	7.1{0.72}	40	
0.9	13.5	27	7.9{0.81}	45	
0.9	13.5	30	8.8{0.9}	50	
0.9	13.5	33	9.7{0.99}	55	
1.0	22	36	10.6{1.08}	60	
1.0	22	39	11.5{1.17}	65	
1.0	22	42	12.4{1.26}	70	
1.0	22	48	14.1{1.4}	80	
1.0	22	54	15.9{1.62}	90	
0.7	4.6	9	2.6{0.27}	WR14—15	
0.75	5.6	12	3.5{0.36}	20	
0.8	7.2	15	4.4{0.45}	25	
0.8	7.2	18	5.3{0.54}	30	
0.8	7.2	21	6.2{0.63}	35	
0.9	11.3	24	7.1{0.72}	40	
0.9	11.3	27	7.9{0.81}	45	
0.9	11.3	30	8.8{0.9}	50	
1.0	18	33	9.7{0.99}	55	
1.0	18	36	10.6{1.08}	60	
1.0	18	39	11.5{1.17}	65	
1.0	18	42	12.4{1.26}	70	
1.1	28.6	48	14.1{1.4}	80	
1.1	28.6	54	15.9{1.62}	90	
0.75	4.5	9	2.6{0.27}	WR16—15	
0.8	5.6	12	3.5{0.36}	20	
0.9	8	15	4.4{0.45}	25	
0.9	8	18	5.3{0.54}	30	
0.9	8	21	6.2{0.63}	35	
1.0	13	24	7.1{0.72}	40	
1.0	13	27	7.9{0.81}	45	
1.0	13	30	8.8{0.9}	50	
1.0	13	33	9.7{0.99}	55	
1.1	20	36	10.6{1.08}	60	
1.1	20	39	11.5{1.17}	65	
1.1	20	42	12.4{1.26}	70	
1.1	20	48	14.1{1.4}	80	
1.2	28.8	54	15.9{1.62}	90	
1.0	7	12	5.8{0.6}	WR18—20	
1.0	7	15	7.4{0.75}	25	
1.1	9.9	18	8.8{0.9}	30	
1.1	9.9	21	10.3{1.05}	35	
1.2	14.4	24	11.8{1.2}	40	
1.2	14.4	27	13.2{1.35}	45	
1.2	14.4	30	14.7{1.5}	50	
1.3	19.5	33	16.2{1.65}	55	
1.3	19.5	36	17.7{1.8}	60	
1.3	19.5	39	19.1{1.95}	65	
1.3	19.5	42	20.6{2.1}	70	
1.4	27.3	48	23.5{2.4}	80	
1.0	6	12	5.8{0.6}	WR20—20	
1.1	8.3	15	7.4{0.75}	25	
1.1	8.3	18	8.8{0.9}	30	
1.2	10.8	21	10.3{1.05}	35	
1.2	10.8	24	11.8{1.2}	40	
1.2	10.8	27	13.2{1.35}	45	
1.3	15	30	14.7{1.5}	50	
1.3	15	33	16.2{1.65}	55	
1.3	15	36	17.7{1.8}	60	
1.3	15	39	19.1{1.95}	65	
1.4	21	42	20.6{2.1}	70	
1.4	21	48	23.5{2.4}	80	
1.1	6.9	12	5.9{0.6}	WR22—20	
1.2	9	15	7.4{0.75}	25	
1.2	9	18	8.8{0.9}	30	
1.3	12.4	21	10.3{1.05}	35	
1.3	12.4	24	11.8{1.2}	40	
1.3	12.4	27	13.2{1.35}	45	
1.4	16.1	30	14.7{1.5}	50	
1.4	16.1	33	16.2{1.65}	55	
1.4	16.1	36	17.7{1.8}	60	
1.5	22.5	39	19.1{1.95}	65	
1.5	22.5	42	20.6{2.1}	70	
1.5	22.5	48	23.5{2.4}	80	
1.3	8.5	18	8.8{0.9}	WR27—30	
1.4	10.5	21	10.3{1.05}	35	
1.4	10.5	24	11.8{1.2}	40	
1.4	10.5	27	13.2{1.35}	45	
1.6	17.6	30	14.7{1.5}	50	
1.6	17.6	33	16.2{1.65}	55	
1.6	17.6	36	17.7{1.8}	60	
1.7	22.1	39	19.1{1.95}	65	
1.7	22.1	42	20.6{2.1}	70	
1.7	22.1	48	23.5{2.4}	80	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- No grinding on both ends of all WR type springs.
- The solid height values are for reference only. There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide ☞ **P.1219**
- Instructions and notes for coil springs ☞ **P.1221**

■WF:Fmax.(allowable deflection)=L×45%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.26	2	2.25	1.1{0.11}	WF 3— 5*	Quotation
0.32	5	4.5	2.2{0.22}	10*	
0.32	5	6.7	3.2{0.33}	15*	
0.35	7	9	4.4{0.45}	20*	
0.35	7	11.2	5.5{0.56}	25*	
0.4	13.2	13.5	6.6{0.67}	30	
0.4	13.2	15.7	7.6{0.78}	35	
0.4	13.2	18	8.8{0.9}	40	
0.32	2.3	2.25	1.1{0.11}	WF 4— 5*	
0.35	3.1	4.5	2.2{0.22}	10*	
0.4	5.6	6.7	3.2{0.33}	15*	
0.4	5.6	9	4.4{0.45}	20*	
0.45	9.9	11.2	5.5{0.56}	25*	
0.45	9.9	13.5	6.6{0.67}	30*	
0.5	16.5	15.7	7.6{0.78}	35	
0.5	16.5	18	8.8{0.9}	40	
0.5	16.5	20	9.8{1.0}	45	
0.5	16.5	22.5	10.8{1.1}	50	
0.5	16.5	24.7	12.1{1.23}	55	
0.5	16.5	27	12.7{1.3}	60	
0.55	26.4	29.2	14.3{1.46}	65*	
0.55	26.4	31.5	15.4{1.58}	70*	
0.35	2	2.25	1.1{0.11}	WF 5— 5*	
0.38	2.8	4.5	2.2{0.22}	10*	
0.4	3.4	6.7	3.2{0.33}	15*	
0.45	5.4	9	4.4{0.45}	20*	
0.5	8.5	11.2	5.5{0.56}	25*	
0.55	13.2	13.5	6.6{0.67}	30	
0.55	13.2	15.7	7.6{0.78}	35	
0.55	20.4	18	8.8{0.9}	40	
0.6	20.4	20	9.8{1.0}	45	
0.6	20.4	22.5	10.8{1.1}	50	
0.6	20.4	24.7	12.1{1.23}	55	
0.6	20.4	27	12.7{1.3}	60	
0.6	20.4	29.2	14.3{1.5}	65	
0.6	20.4	31.5	15.4{1.6}	70	
0.4	2.3	2.25	1.1{0.11}	WF 6— 5*	
0.5	5	4.5	2.2{0.22}	10	
0.55	8	6.7	3.2{0.33}	15	
0.55	8	9	4.4{0.45}	20	
0.6	12	11.2	5.5{0.56}	25	
0.65	16	13.5	6.6{0.67}	30	
0.65	17	15.7	7.6{0.78}	35	
0.65	17	18	8.8{0.9}	40	
0.65	17	20	9.8{1.0}	45	
0.7	25.2	22.5	10.8{1.1}	50	
0.7	25.2	24.7	12.1{1.23}	55	
0.7	25.2	27	12.7{1.3}	60	
0.7	25.2	29.2	14.3{1.46}	65	
0.7	25.2	31.5	14.7{1.5}	70	
0.7	25.2	36	17.7{1.8}	80	
0.6	5	4.5	2.2{0.22}	WF 8—10	
0.65	7.5	6.7	3.2{0.33}	15	
0.7	10.8	9	4.4{0.45}	20	
0.7	10.8	11.2	5.5{0.56}	25	
0.75	14.5	13.5	6.6{0.67}	30	
0.75	14.5	15.7	7.6{0.78}	35	
0.8	20	18	8.8{0.9}	40	
0.8	20	20	9.8{1.0}	45	
0.8	20	22.5	10.8{1.1}	50	
0.8	20	24.7	12.1{1.23}	55	
0.85	27.6	27	12.7{1.3}	60	
0.85	27.6	29.2	14.3{1.46}	65	
0.85	27.6	31.5	14.7{1.5}	70	
0.85	28.1	36	17.7{1.8}	80	
0.65	5	4.5	2.2{0.22}	WF10—10	
0.65	5	6.7	3.2{0.33}	15	
0.8	10.4	9	4.4{0.45}	20	
0.8	10.4	11.2	5.5{0.56}	25	
0.85	14	13.5	6.6{0.67}	30	
0.85	14	15.7	7.6{0.78}	35	
0.9	17.5	18	8.8{0.9}	40	
0.9	17.5	20	9.8{1.0}	45	
0.9	17.5	22.5	10.8{1.1}	50	
0.9	17.5	24.7	12.1{1.23}	55	
1.0	31	27	12.7{1.3}	60	
1.0	31	29.2	14.3{1.46}	65	
1.0	31	31.5	14.7{1.5}	70	
1.0	31	36	17.7{1.8}	80	
0.7	4.6	4.5	2.3{0.23}	WF12—10	
0.7	4.6	6.7	3.2{0.33}	15	
0.8	7.2	9	4.4{0.45}	20	
0.8	7.2	11.2	5.5{0.56}	25	
0.9	11.3	13.5	6.6{0.67}	30	
0.9	11.3	15.7	7.6{0.78}	35	
0.9	11.3	18	8.8{0.9}	40	
0.9	11.3	20	9.8{1.0}	45	
1.0	18	22.5	10.8{1.1}	50	
1.0	18	24.7	12.1{1.23}	55	
1.0	18	27	12.7{1.3}	60	
1.0	18	29.2	14.3{1.46}	65	
1.1	28.1	31.5	14.7{1.5}	70	
1.1	27.5	36	17.7{1.8}	80	
0.75	4.9	4.5	2.3{0.23}	WF13—10	
0.8	6	6.7	3.2{0.33}	15	
0.8	6	9	4.4{0.45}	20	
0.85	7.2	11.2	5.5{0.56}	25	
1.0	15	13.5	6.6{0.67}	30	
1.0	15	15.7	7.6{0.78}	35	
1.0	15	18	8.8{0.9}	40	
1.0	15	20	9.8{1.0}	45	
1.0	15	22.5	10.8{1.1}	50	
1.1	22	24.7	12.1{1.23}	55	
1.1	22	27	12.7{1.3}	60	
1.1	22	29.2	14.3{1.46}	65	
1.1	22	31.5	14.7{1.5}	70	
1.1	22	36	17.7{1.8}	80	
1.2	33.6	40.5	19.9{2.0}	90	
0.8	5.2	6.7	3.2{0.33}	WF14—15	
0.9	7.9	9	4.4{0.45}	20	
0.9	7.9	11.2	5.5{0.56}	25	
1.0	12	13.5	6.6{0.67}	30	
1.0	12	15.7	7.6{0.78}	35	
1.0	12	18	8.8{0.9}	40	
1.0	12	20	9.8{1.0}	45	
1.1	18.2	22.5	10.8{1.1}	50	
1.1	18.2	24.7	12.1{1.23}	55	
1.1	18.2	27	12.7{1.3}	60	
1.2	27.6	29.2	14.3{1.46}	65	
1.2	27.6	31.5	14.7{1.5}	70	
1.2	27.6	36	17.7{1.8}	80	
1.3	39.7	40.5	19.9{2.0}	90	
0.9	6.3	6.7	3.2{0.33}	WF16—15	
1.0	8.7	9	4.4{0.45}	20	
1.0	8.7	11.2	5.5{0.56}	25	
1.1	12.8	13.5	6.6{0.67}	30	
1.1	12.8	15.7	7.6{0.78}	35	
1.2	18.6	18	8.8{0.9}	40	
1.2	18.6	20	9.8{1.0}	45	
1.2	18.6	22.5	10.8{1.1}	50	
1.2	18.6	24.7	12.1{1.23}	55	
1.3	26.8	27	12.7{1.3}	60	
1.3	26.8	29.2	14.3{1.46}	65	
1.3	26.8	31.5	14.7{1.5}	70	
1.4	36	36	17.7{1.8}	80	
1.4	36.4	40.5	19.9{2.0}	90	
1.2	9	9	8.8{0.9}	WF18—20	
1.3	12.4	11.2	10.8{1.1}	25	
1.3	12.4	13.5	12.7{1.3}	30	
1.4	16.1	15.7	14.7{1.5}	35	
1.5	21	18	17.7{1.8}	40	
1.5	21	20	19.9{2.03}	45	
1.5	21	22.5	22.1{2.25}	50	
1.6	28.8	24.7	24.3{2.48}	55	
1.6	28.8	27	26.5{2.7}	60	
1.6	28.8	29.2	28.7{2.93}	65	
1.7	37.4	31.5	30.9{3.15}	70	
1.7	37.4	36	35.3{3.6}	80	
1.2	7.2	9	8.8{0.9}	WF20—20	
1.3	9.8	11.2	10.8{1.1}	25	
1.4	12.6	13.5	12.7{1.3}	30	
1.4	12.6	15.7	14.7{1.5}	35	
1.5	16.5	18	17.7{1.8}	40	
1.5	16.5	20	19.9{2.03}	45	
1.6	21.6	22.5	22.1{2.25}	50	
1.6	21.6	24.7	24.3{2.48}	55	
1.6	21.6	27	26.5{2.7}	60	
1.7	28.1	29.2	28.7{2.93}	65	
1.7	28.1	31.5	30.9{3.15}	70	
1.7	28.1	36	35.3{3.6}	80	
1.3	7.8	9	8.8{0.9}	WF22—20	
1.4	10.5	11.2	11.0{1.12}	25	
1.4	10.5	13.5	13.2{1.35}	30	
1.5	13.5	15.7	15.4{1.57}	35	
1.5	13.5	18	17.7{1.8}	40	
1.7	22.1	20.2	19.8{2.02}	45	
1.7	22.1	22.5	22.1{2.25}	50	
1.7	22.1	24.7	24.2{2.47}	55	
1.8	28.8	27	26.5{2.7}	60	
1.8	28.8	29.2	28.6{2.92}	65	
1.8	28.8	31.5	30.9{3.15}	70	
1.8	28.8	36	35.3{3.6}	80	
1.7	14.1	13.5	13.2{1.35}	WF27—30	
1.7	14.1	15.7	15.4{1.57}	35	
1.7	14.1	18	17.7{1.8}	40	
1.9	21.4	20.2	19.8{2.02}	45	
1.9	21.4	22.5	22.1{2.25}	50	
2.0	26	24.7	24.2{2.47}	55	
2.0	26	27	26.5{2.7}	60	
2.0	26	29.2	28.6{2.92}	65	
2.0	26	31.5	30.9{3.15}	70	
2.0	26	36	35.3{3.6}	80	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- No grinding on both ends of WF type springs marked with *.
- The solid height values are for reference only.
  There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide ☞ **P.1219**
- Instructions and notes for coil springs ☞ **P.1221**

WIRE SPRINGS

—WL (40% DEFLECTION) · WT (40% DEFLECTION)—

Order **Part Number** WL13—60

Days to Ship **Quotation**

Price **Quotation**

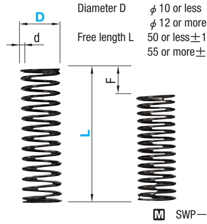
■WL:Fmax.(allowable deflection)=L×40%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.2	1.7	2	0.98{0.1}	WL 2— 5*	Quotation
0.26	5.2	4	2.0 {0.2}	10*	
0.26	5.2	6	2.9 {0.3}	15*	
0.29	9	8	3.9 {0.4}	20*	
0.29	9	10	4.9 {0.5}	25*	
0.3	10.8	12	5.9 {0.6}	30*	
0.3	2.1	2	2.0 {0.2}	WL 3— 5*	
0.35	3.9	4	3.9 {0.4}	10*	
0.4	6.5	6	5.9 {0.6}	15*	
0.4	6.5	8	7.8 {0.8}	20*	
0.45	13	10	9.8 {1.0}	25*	
0.45	13	12	11.8 {1.2}	30*	
0.45	13	14	13.7 {1.4}	35*	
0.5	21	16	15.7 {1.6}	40*	
0.35	2.1	2	2.0 {0.2}	WL 4— 5*	
0.45	5	4	3.9 {0.4}	10*	
0.45	5	6	5.9 {0.6}	15*	
0.5	9	8	7.8 {0.8}	20	
0.5	9	10	9.8 {1.0}	25	
0.55	13.9	12	11.8 {1.2}	30	
0.55	13.9	14	13.7 {1.4}	35	
0.6	21.6	16	15.7 {1.6}	40	
0.6	21.6	18	17.7 {1.8}	45	
0.6	21.6	20	19.6 {2.0}	50	
0.6	21.6	22	21.6 {2.2}	55	
0.65	33	24	23.5 {2.4}	60	
0.4	2.3	2	2.0 {0.2}	WL 5— 5*	
0.45	3.4	4	3.9 {0.4}	10*	
0.5	5	6	5.9 {0.6}	15*	
0.55	7.7	8	7.8 {0.8}	20	
0.6	10.8	10	9.8 {1.0}	25	
0.6	10.8	12	11.8 {1.2}	30	
0.65	15.6	14	13.7 {1.4}	35	
0.65	15.6	16	15.7 {1.6}	40	
0.7	20	18	17.7 {1.8}	45	
0.7	20	20	19.6 {2.0}	50	
0.7	23.1	22	21.6 {2.2}	55	
0.75	33	24	23.5 {2.4}	60	
0.75	32.3	26	25.5 {2.6}	65	
0.75	32.3	28	27.5 {2.8}	70	
0.45	2.5	2	2.0 {0.2}	WL 6— 5*	
0.55	4.7	4	3.9 {0.4}	10	
0.55	4.7	6	5.9 {0.6}	15	
0.65	9	8	7.8 {0.8}	20	
0.65	9	10	9.8 {1.0}	25	
0.7	13.7	12	11.8 {1.2}	30	
0.7	13.7	14	13.7 {1.4}	35	
0.7	13.7	16	15.7 {1.6}	40	
0.75	18.9	18	17.7 {1.8}	45	
0.75	18.9	20	19.6 {2.0}	50	
0.75	18.9	22	21.6 {2.2}	55	
0.8	26.4	24	23.5 {2.4}	60	
0.8	26.4	26	25.5 {2.6}	65	
0.85	30.6	28	27.5 {2.8}	70	
0.85	34.9	32	31.4 {3.2}	80	
0.65	4.7	4	3.9{0.4}	WL 8—10	
0.75	8.5	6	5.9{0.6}	15	
0.75	8.5	8	7.8{0.8}	20	
0.75	8.5	10	9.8{1.0}	25	
0.8	11.2	12	11.8{1.2}	30	
0.8	11.2	14	13.7{1.4}	35	
0.8	11.2	16	15.7{1.6}	40	
0.85	15.3	18	17.7{1.8}	45	
0.85	15.3	20	19.6{2.0}	50	
0.85	15.3	22	21.6{2.2}	55	
0.9	19.4	24	23.5{2.4}	60	
0.9	19.4	26	25.5{2.6}	65	
1.0	31	28	27.5{2.8}	70	
1.0	31	32	31.4{3.2}	80	
0.75	5.3	4	3.9{0.4}	WL10—10	
0.8	6.4	6	5.9{0.6}	15	
0.8	6.4	8	7.8{0.8}	20	
0.9	10.8	10	9.8{1.0}	25	
0.9	10.8	12	11.8{1.2}	30	
0.9	10.8	14	13.7{1.4}	35	
0.9	10.8	16	15.7{1.6}	40	
1.0	17	18	17.7{1.8}	45	
1.0	17	20	19.6{2.0}	50	
1.0	17	22	21.6{2.2}	55	
1.0	17	24	23.5{2.4}	60	
1.1	24	26	25.5{2.6}	65	
1.1	24	28	27.5{2.8}	70	
1.1	24.2	32	31.4{3.2}	80	
0.8	4.8	4	4.0{0.4}	WL12—10	
0.9	7.2	6	5.9{0.6}	15	
0.9	7.2	8	7.8{0.8}	20	
0.9	7.2	10	9.8{1.0}	25	
1.0	10.5	12	11.8{1.2}	30	
1.0	10.5	14	13.7{1.4}	35	
1.0	10.5	16	15.7{1.6}	40	
1.1	15.4	18	17.7{1.8}	45	
1.1	15.4	20	19.6{2.0}	50	
1.1	15.4	22	21.6{2.2}	55	
1.2	22.8	24	23.5{2.4}	60	
1.2	22.8	26	25.5{2.6}	65	
1.2	22.8	28	27.5{2.8}	70	
1.3	34.5	32	31.4{3.2}	80	
0.85	5.1	4	4.0{0.4}	WL13—10	
0.9	6.3	6	5.9{0.6}	15	
1.0	8.7	8	7.8{0.8}	20	
1.0	8.7	10	9.8{1.0}	25	
1.1	13.2	12	11.8{1.2}	30	
1.1	13.2	14	13.7{1.4}	35	
1.1	13.2	16	15.7{1.6}	40	
1.1	13.2	18	17.7{1.8}	45	
1.1	13.2	20	19.6{2.0}	50	
1.1	13.2	22	21.6{2.2}	55	
1.1	13.2	24	23.5{2.4}	60	
1.2	18.6	26	25.5{2.6}	65	
1.2	18.6	28	27.5{2.8}	70	
1.4	37.8	32	31.4{3.2}	80	
1.4	37.8	36	35.3{3.6}	90	
1.0	7.5	6	5.9{0.6}	WL14—15	
1.0	7.5	8	7.8{0.8}	20	
1.0	7.5	10	9.8{1.0}	25	
1.1	11	12	11.8{1.2}	30	
1.1	11	14	13.7{1.4}	35	
1.1	11	16	15.7{1.6}	40	
1.2	15.6	18	17.7{1.8}	45	
1.2	15.6	20	19.6{2.0}	50	
1.2	15.6	22	21.6{2.2}	55	
1.2	15.6	24	23.5{2.4}	60	
1.3	22.1	26	25.5{2.6}	65	
1.3	22.1	28	27.5{2.8}	70	
1.3	22.1	32	31.4{3.2}	80	
1.5	43.5	36	35.3{3.6}	90	
1.1	8.2	6	5.9{ 0.6}	WL16—15	
1.1	8.2	8	7.8{ 0.8}	20	
1.2	10	10	9.8{ 1.0}	25	
1.2	10	12	11.8{ 1.2}	30	
1.2	10	14	13.7{ 1.4}	35	
1.2	10	16	15.7{ 1.6}	40	
1.4	21	18	17.7{ 1.8}	45	
1.4	21	20	19.6{ 2.0}	50	
1.4	21	22	21.6{ 2.2}	55	
1.4	21	24	23.5{ 2.4}	60	
1.5	29.7	26	25.5{ 2.6}	65	
1.5	29.7	28	27.5{ 2.8}	70	
1.5	29.7	32	31.4{ 3.2}	80	
1.6	40	36	35.3{ 3.6}	90	
1.5	10	8	23.5{ 2.4}	WL18—20	
1.6	12	10	29.4{ 3.0}	25	
1.6	12	12	35.3{ 3.6}	30	
1.7	16.2	14	41.2{ 4.2}	35	
1.7	16.2	16	47.1{ 4.8}	40	
1.8	19.8	18	53.0{ 5.4}	45	
1.8	19.8	20	58.8{ 6.0}	50	
1.8	19.8	22	64.7{ 6.6}	55	
1.8	19.8	24	70.6{ 7.2}	60	
2.0	32	26	76.5{ 7.8}	65	
2.0	32	28	82.4{ 8.4}	70	
2.0	32	32	94.1{ 9.6}	80	
2.2	43	36	105.9{10.8}	90	
2.2	43	40	117.7{12.0}	100	
1.6	10.4	8	23.5{ 2.4}	WL20—20	
1.6	10.4	10	29.4{ 3.0}	25	
1.7	12.8	12	35.3{ 3.6}	30	
1.7	12.8	14	41.2{ 4.2}	35	
1.8	15.8	16	47.1{ 4.8}	40	
1.8	15.8	18	53.0{ 5.4}	45	
1.8	15.8	20	58.8{ 6.0}	50	
1.8	15.8	22	64.7{ 6.6}	55	
2.0	24	24	70.6{ 7.2}	60	
2.0	24	26	76.5{ 7.8}	65	
2.0	24	28	82.4{ 8.4}	70	
2.2	37.4	32	94.1{ 9.6}	80	
2.2	37.4	36	105.9{10.8}	90	
2.2	37.4	40	117.7{12.0}	100	
1.7	10.8	8	23.5{ 2.4}	WL22—20	
1.8	13.3	10	29.4{ 3.0}	25	
1.8	13.3	12	35.3{ 3.6}	30	
1.8	13.3	14	41.2{ 4.2}	35	
2.0	20	16	47.1{ 4.8}	40	
2.0	20	18	53.0{ 5.4}	45	
2.0	20	20	58.8{ 6.0}	50	
2.0	20	22	64.7{ 6.6}	55	
2.2	28.6	24	70.6{ 7.2}	60	
2.2	28.6	26	76.5{ 7.8}	65	
2.2	28.6	28	82.4{ 8.4}	70	
2.2	28.6	32	94.1{ 9.6}	80	
2.3	34.5	36	105.9{10.8}	90	
2.3	34.5	40	117.7{12.0}	100	
2.1	14	12	35.3{ 3.6}	WL27—30	
2.1	14	14	41.2{ 4.2}	35	
2.3	19	16	47.1{ 4.8}	40	
2.3	19	18	53.0{ 5.4}	45	
2.3	19	20	58.8{ 6.0}	50	
2.3	19	22	64.7{ 6.6}	55	
2.5	28	24	70.6{ 7.2}	60	
2.5	28	26	76.5{ 7.8}	65	
2.6	34.5	28	82.4{ 8.4}	70	
2.6	34.5	32	94.1{ 9.6}	80	
2.8	46.7	36	105.9{10.8}	90	
2.8	46.7	40	117.7{12.0}	100	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- No grinding on both ends of WL type springs marked with *.
- The solid height values are for reference only. There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide **P.1219**
- Instructions and notes for coil springs **P.1221**

WL
WT



Spring constant ±10%
Diameter D ϕ10 or less $^{0}_{-0.5}$mm
ϕ12 or more $^{0}_{-0.8}$mm
Free length L 50 or less±1.5mm
55 or more±2mm

RoHS

M SWP—A

■Spring constant

D12/14/20 of WT type are not available.

D \ Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5{0.05}				
3	N/mm 0.1 {kgf/mm} {0.01}	N/mm 0.3 {kgf/mm} {0.03}	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	1.5 {0.15}	2.0 {0.2}		3.9{0.4}
4							2.9{0.3}	4.9{0.5}
5					N/mm 2.0 {kgf/mm} {0.2}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}	N/mm 9.8 {kgf/mm} {1.0}
6								
8								
10	N/mm 0.2 {kgf/mm} {0.02}							
12								
13							N/mm 9.8 {kgf/mm} {1.0}	N/mm 19.6 {kgf/mm} {2.0}
14								
16								
18		N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 3.9 {kgf/mm} {0.4}	N/mm 4.9 {kgf/mm} {0.5}	N/mm 14.7 {kgf/mm} {1.5}	29.4{3.0}
20								
22								29.4 {3.0}
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

■WT:Fmax.(allowable deflection)=L×40%(L×35%)

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.3	1.73	2	2.9{0.3}	WT 3— 5*	Quotation
0.4	5	4	5.9{0.6}	10*	
0.45	8.78	6	8.8{0.9}	15*	
0.45	8.78	8	11.8{1.2}	20*	
0.5	14.5	10	14.7{1.5}	25*	
0.4	2.7	2	2.9{0.3}	WT 4— 5*	
0.4	2.7	4	5.9{0.6}	10*	
0.5	6.5	6	8.8{0.9}	15*	
0.55	9.63	8	11.8{1.2}	20	
0.55	9.63	10	14.7{1.5}	25	
0.6	15	12	17.7{1.8}	30	
0.6	15	14	20.6{2.1}	35	
0.65	22.1	16	23.5{2.4}	40	
0.45	2.36	2	3.9{0.4}	WT 5— 5*	
0.5	3.25	4	7.8{0.8}	10*	
0.6	6.3	6	11.8{1.2}	15	
0.6	6.3	8	15.7{1.6}	20	
0.7	12.6	10	19.6{2.0}	25	
0.7	12.6	12	23.5{2.4}	30	
0.75	17.3	14	27.5{2.8}	35	
0.75	17.3	14	27.5{2.8}	(40)	
0.8	24	15.8	30.9{3.2}	(45)	
0.8	24	17.5	34.3{3.5}	(50)	
0.85	32.3	19.3	37.8{3.9}	(55)	
0.85	32.3	21	41.2{4.2}	(60)	
0.85	34	22.7	44.5{4.5}	(65)	
0.9	44.6	24.5	48.1{4.9}	(70)	
0.5	2.38	2	3.9{0.4}	WT 6— 5*	
0.6	4.35	4	7.8{0.8}	10	
0.6	4.35	6	11.8{1.2}	15	
0.7	7.7	8	15.7{1.6}	20	
0.7	7.7	10	19.6{2.0}	25	
0.8	14	12	23.5{2.4}	30	
0.8	14	14	27.5{2.8}	35	
0.85	18.7	16	31.4{3.2}	40	
0.85	18.7	18	35.3{3.6}	45	
0.9	24.8	20	39.2{4.0}	50	
0.9	24.8	19	37.8{3.9}	(55)	
0.9	24.8	21	41.2{4.2}	(60)	
0.9	26.1	22.7	44.5{4.5}	(65)	
1	43	24.5	48.1{4.9}	(70)	
1	43	28	54.9{5.6}	(80)	
0.7	4.38	4	7.8{0.8}	WT 8—10	
0.8	6.8	6	11.8{1.2}	15	
0.8	6.8	8	15.7{1.6}	20	
0.8	6.8	10	19.6{2.0}	25	
0.9	10.8	12	23.5{2.4}	30	
0.9	10.8	14	27.5{2.8}	35	
1	17.5	16	31.4{3.2}	40	
1	17.5	18	35.3{3.6}	45	
1	17.5	20	39.2{4.0}	50	
1.1	27.5	22	43.1{4.4}	55	
1.1	27.5	24	47.1{4.8}	60	
1.1	27.5	26	51.0{5.2}	65	
1.1	27.5	28	54.9{5.6}	70	
1.2	42	32	62.8{6.4}	80	
0.85	5.53	4	7.8{0.8}	WT10—10	
0.9	6.75	6	11.8{1.2}	15	
0.9	6.75	8	15.7{1.6}	20	
1	10	10	19.6{2.0}	25	
1	10	12	23.5{2.4}	30	
1	10	14	27.5{2.8}	35	
1	10	16	31.4{3.2}	40	
1.1	14.3	18	35.3{3.6}	45	
1.1	14.3	20	39.2{4.0}	50	
1.2	21.6	22	43.1{4.4}	55	
1.2	21.6	24	47.1{4.8}	60	
1.2	21.6	26	51.0{5.2}	65	
1.3	32.5	28	54.9{5.6}	70	
1.3	32.5	32	62.8{6.4}	80	
1	6	6	11.8{1.2}	WT13—15	
1.1	8.25	8	15.7{1.6}	20	
1.1	8.25	10	19.6{2.0}	25	
1.2	11.1	12	23.5{2.4}	30	
1.2	11.1	14	27.5{2.8}	35	
1.2	11.1	16	31.4{3.2}	40	
1.2	11.1	18	35.3{3.6}	45	
1.3	15.6	20	39.2{4.0}	50	
1.3	15.6	22	43.1{4.4}	55	
1.3	15.6	24	47.1{4.8}	60	
1.4	21	26	51.0{5.2}	65	
1.4	21	28	54.9{5.6}	70	
1.4	21	32	62.8{6.4}	80	
1.2	7.5	6	11.8{1.2}	WT16—15	
1.3	9.43	8	15.7{1.6}	20	
1.4	12.6	10	19.6{2.0}	25	
1.4	12.6	12	23.5{2.4}	30	
1.4	12.6	14	27.5{2.8}	35	
1.4	12.6	16	31.4{3.2}	40	
1.6	22.4	18	35.3{3.6}	45	
1.6	22.4	20	39.2{4.0}	50	
1.6	22.4	22	43.1{4.4}	55	
1.7	28.9	24	47.1{4.8}	60	
1.7	28.9	26	51.0{5.2}	65	
1.7	28.9	28	54.9{5.6}	70	
1.7	28.9	32	62.8{6.4}	80	
1.6	10.8	8	31.4{ 3.2}	WT18—20	
1.7	13.6	10	39.2{ 4.0}	25	
1.7	13.6	12	47.1{ 4.8}	30	
1.7	13.6	14	54.9{ 5.6}	35	
1.8	16.7	16	62.8{ 6.4}	40	
1.9	20.5	18	70.6{ 7.2}	45	
1.9	20.5	20	78.5{ 8.0}	50	
2	26	22	86.3{ 8.8}	55	
2	26	24	94.1{ 9.6}	60	
2	26	26	102.0{10.4}	65	
2	26	28	109.8{11.2}	70	
2.1	31.5	32	125.5{12.8}	80	
1.8	11.3	8	31.4{ 3.2}	WT22—20	
1.8	11.3	10	39.2{ 4.0}	25	
1.9	13.3	12	47.1{ 4.8}	30	
1.9	13.3	14	54.9{ 5.6}	35	
2	16	16	62.8{ 6.4}	40	
2.1	19.5	18	70.6{ 7.2}	45	
2.1	19.5	20	78.5{ 8.0}	50	
2.3	28.2	22	86.3{ 8.8}	55	
2.3	28.2	24	94.1{ 9.6}	60	
2.3	28.2	26	102.0{10.4}	65	
2.3	28.2	28	109.8{11.2}	70	
2.4	33.6	32	125.5{12.8}	80	
2.1	13.2	12	47.1{ 4.8}	WT27—30	
2.3	17.9	14	54.9{ 5.6}	35	
2.3	17.9	16	62.8{ 6.4}	40	
2.4	20.4	18	70.6{ 7.2}	45	
2.6	28.6	20	78.5{ 8.0}	50	
2.6	28.6	22	86.3{ 8.8}	55	
2.6	28.6	24	94.1{ 9.6}	60	
2.6	28.6	26	102.0{10.4}	65	
2.8	39.2	28	109.8{11.2}	70	
2.8	39.2	32	125.5{12.8}	80	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- (L) size allowable deflection
  - WT5—40Fmax.=L×35%
  - WT5—45Fmax.=L×35%
  - WT5—50Fmax.=L×35%
  - WT5—55Fmax.=L×35%
  - WT5—60Fmax.=L×35%
  - WT5—65Fmax.=L×35%
  - WT5—70Fmax.=L×35%
  - WT6—55Fmax.=L×35%
  - WT6—60Fmax.=L×35%
  - WT6—65Fmax.=L×35%
  - WT6—70Fmax.=L×35%
  - WT6—80Fmax.=L×35%
- No grinding on both ends of WT type springs marked with *.

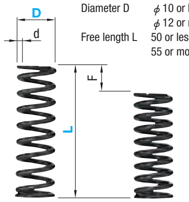
- The solid height values are for reference only. There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide **P.1219**
- Instructions and notes for coil springs **P.1221**

WIRE SPRINGS

—WM (35% DEFLECTION) • WH(30% DEFLECTION)—

Order	Part Number	Days to Ship	Price
☎	WM13—60	Quotation	Quotation

WM
WH



Spring constant ±10%

Diameter D ϕ10 or less $^{0}_{-0.5}$mm
ϕ12 or more $^{0}_{-0.8}$mm

Free length L 50 or less±1.5mm
55 or more±2mm

RoHS

M SWP—A

■Spring constant

D \ Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5{0.05}				
3	N/mm 0.1 {kgf/mm} {0.01}	N/mm 0.3 {kgf/mm} {0.03}	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	1.5 {0.15}	2.0 {0.2}		3.9{0.4}
4							2.9{0.3}	4.9{0.5}
5					N/mm 2.0 {kgf/mm} {0.2}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}	N/mm 9.8 {kgf/mm} {1.0}
6								
8								
10	N/mm 0.2 {kgf/mm} {0.02}							
12								
13							N/mm 9.8 {kgf/mm} {1.0}	N/mm 19.6 {kgf/mm} {2.0}
14								
16								
18		N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 3.9 {kgf/mm} {0.4}	N/mm 4.9 {kgf/mm} {0.5}	N/mm 14.7 {kgf/mm} {1.5}	29.4{3.0}
20								
22								29.4 {3.0}
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

■WM:Fmax.(allowable deflection)=L×35%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.35	2.5	1.8	3.4{0.4}	WM 3— 5*	
0.38	3.3	3.5	6.9{0.7}	10*	
0.45	7	5.3	10.3{1.1}	15*	
0.5	11.5	7	13.7{1.4}	20*	
0.5	11.5	7.5	14.7{1.5}	(25)	
0.55	20.4	9	17.7{1.8}	(30)	
0.4	2.3	1.7	3.9{0.4}	WM 4— 5*	
0.45	3.4	3.5	6.9{0.7}	10*	
0.5	5.1	5.2	10.8{1.1}	15*	
0.55	7.7	7	13.7{1.4}	20	
0.6	11.7	8.7	17.7{1.8}	25	
0.6	11.7	10.5	20.6{2.1}	30	
0.65	17.6	12.2	24.0{2.5}	35	
0.65	17.6	12	23.5{2.4}	(40)	
0.5	2.8	1.7	4.9{0.5}	WM 5— 5*	
0.6	4.2	3.5	9.8{1.0}	10	
0.65	6.5	5.2	14.7{1.5}	15	
0.65	6.5	7	20.6{2.1}	20	
0.7	9.1	8.7	25.5{2.6}	25	
0.75	12.7	10.5	30.4{3.1}	30	
0.8	17.4	12.2	35.3{3.6}	35	
0.85	23.8	14	41.2{4.2}	40	
0.85	23.8	15.8	46.1{4.7}	45	
0.9	23.8	15	43.5{4.5}	(50)	
0.9	30	16.5	49.0{5.0}	(55)	
0.9	30	18	53.0{5.4}	(60)	
0.9	30	17.6	52.0{5.3}	(65)	
0.9	30	19.6	58.8{6.0}	(70)	
0.55	2.8	1.7	4.9{0.5}	WM 6— 5*	Quotation
0.65	4.7	3.5	9.8{1.0}	10	
0.75	8	5.2	14.7{1.5}	15	
0.75	8	7	20.6{2.1}	20	
0.85	13.6	8.7	25.5{2.6}	25	
0.85	13.6	10.5	30.4{3.1}	30	
0.9	18	12.2	35.3{3.6}	35	
0.9	18	14	41.2{4.2}	40	
0.9	18	15.8	46.1{4.7}	45	
0.9	18	17.5	51.0{5.2}	50	
1.0	31	19.2	55.9{5.7}	55	
1.0	31	18	53.0{5.4}	(60)	
1.0	31	18.8	54.9{5.6}	(65)	
1.1	47.3	20	58.8{6.0}	(70)	
1.1	48.4	22.4	65.9{6.7}	(80)	
0.75	4.2	3.5	9.8{1.0}	WM 8—10	
0.9	8.5	5.2	14.7{1.5}	15	
0.9	8.5	7	20.6{2.1}	20	
0.9	8.5	8.7	25.5{2.6}	25	
0.9	8.5	10.5	30.4{3.1}	30	
1.0	13	12.2	35.3{3.6}	35	
1.0	13	14	41.2{4.2}	40	
1.1	19.8	15.8	46.1{4.7}	45	
1.1	19.8	17.5	51.0{5.2}	50	
1.2	31.2	19.2	55.9{5.7}	55	
1.2	31.2	21	61.8{6.3}	60	
1.2	31.2	22.7	64.7{6.6}	65	
1.2	31.2	24.5	71.6{7.3}	70	
1.3	44.2	28	82.4{8.4}	80	

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.9	5.2	3.5	9.8{1.0}	WM10—10	
1.0	7.7	5.2	14.7{1.5}	15	
1.0	7.7	7	20.6{2.1}	20	
1.1	11	8.7	25.5{2.6}	25	
1.1	11	10.5	30.4{3.1}	30	
1.2	16.2	12.2	35.3{3.6}	35	
1.2	16.2	14	41.2{4.2}	40	
1.3	22.1	15.8	46.1{4.7}	45	
1.3	22.1	17.5	51.0{5.2}	50	
1.3	22.1	19.2	55.9{5.7}	55	
1.4	32.1	21	61.8{6.3}	60	
1.4	32.1	22.7	64.7{6.6}	65	
1.4	32.1	24.5	71.6{7.3}	70	
1.4	32.2	28	82.4{8.4}	80	
1.0	5.5	3.5	10.3{1.1}	WM12—10	
1.1	7.4	5.2	14.7{1.5}	15	
1.1	7.4	7	20.6{2.1}	20	
1.1	7.4	8.7	25.5{2.6}	25	
1.2	10.2	10.5	30.4{3.1}	30	
1.2	10.2	12.2	35.3{3.6}	35	
1.3	14.3	14	41.2{4.2}	40	
1.3	14.3	15.8	46.1{4.7}	45	
1.3	14.3	17.5	51.0{5.2}	50	
1.4	19.6	19.2	55.9{5.7}	55	
1.4	19.6	21	61.8{6.3}	60	
1.5	26.3	22.7	64.7{6.6}	65	
1.5	26.3	24.5	71.6{7.3}	70	
1.6	36.8	28	82.4{8.4}	80	
1.0	5	3.5	10.3{1.1}	WM13—10	Quotation
1.2	8.4	5.2	14.7{1.5}	15	
1.3	11.7	7	20.6{2.1}	20	
1.3	11.7	8.7	25.5{2.6}	25	
1.4	14.5	10.5	30.4{3.1}	30	
1.4	14.5	12.2	35.3{3.6}	35	
1.4	14.5	14	41.2{4.2}	40	
1.4	14.5	15.8	46.1{4.7}	45	
1.4	14.5	17.5	51.0{5.2}	50	
1.5	22.5	19.2	55.9{5.7}	55	
1.5	22.5	21	61.8{6.3}	60	
1.6	28.8	22.7	64.7{6.6}	65	
1.6	28.8	24.5	71.6{7.3}	70	
1.7	37.4	28	82.4{8.4}	80	
1.7	37.4	31.5	92.9{9.5}	90	
1.2	7.5	5.2	14.7{1.5}	WM14—15	
1.3	9.8	7	20.6{2.1}	20	
1.4	13.3	8.7	25.5{2.6}	25	
1.4	13.3	10.5	30.4{3.1}	30	
1.4	13.3	12.2	35.3{3.6}	35	
1.4	13.3	14	41.2{4.2}	40	
1.5	17.3	15.8	46.1{4.7}	45	
1.5	17.3	17.5	51.0{5.2}	50	
1.5	17.3	19.2	55.9{5.7}	55	
1.6	23.2	21	61.8{6.3}	60	
1.6	23.2	22.7	64.7{6.6}	65	
1.7	30.6	24.5	71.6{7.3}	70	
1.7	30.6	28	82.4{8.4}	80	
1.8	39.6	31.5	92.7{9.5}	90	

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
1.3	7.8	5.2	14.7{ 1.5}	WM16—15	
1.4	9.8	7	20.6{ 2.1}	20	
1.5	12.5	8.7	25.5{ 2.6}	25	
1.5	12.5	10.5	30.4{ 3.1}	30	
1.6	15	12.2	35.3{ 3.6}	35	
1.6	15	14	41.2{ 4.2}	40	
1.7	20.4	15.8	46.1{ 4.7}	45	
1.7	20.4	17.5	51.0{ 5.2}	50	
1.8	27	19.2	55.9{ 5.7}	55	
1.8	27	21	61.8{ 6.3}	60	
1.8	27	22.7	64.7{ 6.6}	65	
1.8	27	24.5	71.6{ 7.3}	70	
1.8	27	28	82.4{ 8.4}	80	
1.9	34.2	31.5	92.7{ 9.5}	90	
1.7	11.9	7	34.3{ 3.5}	WM18—20	
1.8	14.4	8.7	42.2{ 4.3}	25	
1.8	14.4	10.5	51.0{ 5.2}	30	
1.8	14.4	12.2	59.8{ 6.1}	35	
1.8	14.4	14	68.6{ 7.0}	40	
2.0	22	15.8	77.5{ 7.9}	45	
2.0	22	17.5	85.3{ 8.7}	50	
2.0	22	19.2	94.1{ 9.6}	55	
2.0	22	21	103.0{10.5}	60	
2.2	34.1	22.7	110.8{11.3}	65	
2.2	34.1	24.5	119.6{12.2}	70	
2.2	34.1	28	137.3{14.0}	80	
2.3	41.4	31.5	154.0{15.7}	90	
2.3	41.4	35	171.6{17.5}	100	
1.8	11.7	7	34.3{ 3.5}	WM20—20	
1.8	11.7	8.7	42.2{ 4.3}	25	
1.9	14.3	10.5	51.0{ 5.2}	30	
1.9	14.3	12.2	59.8{ 6.1}	35	
1.9	14.3	14	68.6{ 7.0}	40	Quotation
2.0	17	15.8	77.5{ 7.9}	45	
2.0	17	17.5	85.3{ 8.7}	50	
2.2	24.8	19.2	94.1{ 9.6}	55	
2.2	24.8	21	103.0{10.5}	60	
2.2	24.8	22.7	110.8{11.3}	65	
2.2	24.8	24.5	119.6{12.2}	70	
2.4	36	28	137.3{14.0}	80	
2.4	36	31.5	154.0{15.7}	90	
2.4	36	35	171.6{17.5}	100	
1.9	12	7	34.3{ 3.5}	WM22—20	
2.0	14	8.7	42.2{ 4.3}	25	
2.0	14	10.5	51.0{ 5.2}	30	
2.0	14	12.2	59.8{ 6.1}	35	
2.0	14	14	68.6{ 7.0}	40	
2.3	23	15.8	77.5{ 7.9}	45	
2.3	23	17.5	85.3{ 8.7}	50	
2.3	23	19.2	94.1{ 9.6}	55	
2.3	23	21	103.0{10.5}	60	
2.4	30	22.7	110.8{11.3}	65	
2.4	30	24.5	119.6{12.2}	70	
2.4	30	28	137.3{14.0}	80	
2.6	40	31.5	154.0{15.7}	90	
2.6	40	35	171.6{17.5}	100	
2.3	14	10.5	51.0{ 5.2}	WM27—30	
2.4	17	12.2	59.8{ 6.1}	35	
2.4	17	14	68.6{ 7.0}	40	
2.4	18	15.8	77.5{ 7.9}	45	
2.6	23	17.5	85.3{ 8.7}	50	
2.6	23	19.2	94.1{ 9.6}	55	
2.6	23	21	103.0{10.5}	60	
2.8	31	22.7	110.8{11.3}	65	
2.8	31	24.5	119.6{12.2}	70	
2.8	31	28	137.3{14.0}	80	
3.0	43.5	31.5	154.0{15.7}	90	
3.0	43.5	35	171.6{17.5}	100	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- No grinding on both ends of WM type springs marked with *.
- The solid height values are for reference only.
  There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide **P.1219**
- Instructions and notes for coil springs **P.1221**

(L) size allowable deflection
WM3—25 Fmax.=L×30%
WM3—30 Fmax.=L×30%
WM4—40 Fmax.=L×30%
WM5—50 Fmax.=L×30%
WM5—55 Fmax.=L×30%
WM5—60 Fmax.=L×30%
WM5—65 Fmax.=L×27%
WM5—70 Fmax.=L×28%
WM6—60 Fmax.=L×30%
WM6—65 Fmax.=L×29%
WM6—70 Fmax.=L×28%
WM6—80 Fmax.=L×28%

■WH:Fmax.(allowable deflection)=L×30%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.45	2.7	1.5	4.9{ 0.5}	WH 4— 5*	
0.45	2.7	3	8.8{ 0.9}	10*	
0.55	5.8	4.5	13.7{ 1.4}	15	
0.6	8.4	6	17.7{ 1.8}	20	
0.65	12.4	7.5	22.6{ 2.3}	25	
0.65	12.4	9	26.5{ 2.7}	30	
0.6	3.3	1.5	8.8{ 0.9}	WH 5— 5*	
0.7	5.5	3	17.7{ 1.8}	10	
0.75	7.5	4.5	26.5{ 2.7}	15	
0.75	7.5	6	35.3{ 3.6}	20	
0.85	13.6	7.5	44.1{ 4.5}	25	
0.85	13.6	7.5	44.3{ 4.5}	(30)	
0.9	17.1	8.8	51.6{ 5.3}	(35)	
0.9	17.1	8.8	51.9{ 5.3}	(40)	
0.65	3.3	1.5	8.8{ 0.9}	WH 6— 5*	
0.75	5.2	3	17.7{ 1.8}	10	
0.8	6.4	4.5	26.5{ 2.7}	15	
0.9	9.9	6	35.3{ 3.6}	20	
0.9	9.9	7.5	44.1{ 4.5}	25	
1.0	16	9	53.0{ 5.4}	30	
1.0	16	10.5	61.8{ 6.3}	35	
1.1	25	12	70.6{ 7.2}	40	
1.1	25	11.3	66.7{ 6.8}	(45)	
1.2	39.6	10	58.8{ 6.0}	(50)	
1.2	39.6	14.5	85.3{ 8.7}	(55)	
1.2	39.6	14	82.4{ 8.4}	(60)	
1.2	39.6	14	82.4{ 8.4}	(65)	
1.2	39.6	15	88.3{ 9.0}	(70)	Quotation
0.9	5.4	3	17.7{ 1.8}	WH 8—10	
1.0	8	4.5	26.5{ 2.7}	15	
1.1	11.5	6	35.3{ 3.6}	20	
1.1	11.5	7.5	44.1{ 4.5}	25	
1.2	16.8	9	53.0{ 5.4}	30	
1.2	16.8	10.5	61.8{ 6.3}	35	
1.2	16.8	12	70.6{ 7.2}	40	
1.3	24.7	13.5	79.4{ 8.1}	45	
1.3	24.7	15	88.3{ 9.0}	50	
1.4	35	16.5	97.1{ 9.9}	55	
1.4	35	18	105.9{10.8}	60	
1.4	35	17	100.0{10.2}	(65)	
1.4	35	19	111.8{11.4}	(70)	
1.0	5.4	3	17.7{ 1.8}	WH10—10	
1.1	7	4.5	26.5{ 2.7}	15	
1.2	9.6	6	35.3{ 3.6}	20	
1.2	9.6	7.5	44.1{ 4.5}	25	
1.3	13.9	9	53.0{ 5.4}	30	
1.4	18	10.5	61.8{ 6.3}	35	
1.4	18	12	70.6{ 7.2}	40	
1.5	25	13.5	79.4{ 8.1}	45	
1.5	25	15	88.3{ 9.0}	50	
1.5	25	16.5	97.1{ 9.9}	55	
1.5	25	18	105.9{10.8}	60	
1.6	35	19.5	114.7{11.7}	65	
1.6	35	21	123.6{12.6}	70	
1.7	45.9	24	141.0{14.4}	80	

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
1.2	6.9	3	17.7{ 1.8}	WH12—10	
1.3	9.1	4.5	26.5{ 2.7}	15	
1.3	9.1	6	35.3{ 3.6}	20	
1.3	9.1	7.5	44.1{ 4.5}	25	
1.4	11.9	9	53.0{ 5.4}	30	
1.4	11.9	10.5	61.8{ 6.3}	35	
1.5	15.4	12	70.6{ 7.2}	40	
1.5	15.4	13.5	79.4{ 8.1}	45	
1.6	20.4	15	88.3{ 9.0}	50	
1.6	20.4	16.5	97.1{ 9.9}	55	
1.7	26.8	18	105.9{10.8}	60	
1.7	26.8	19.5	114.7{11.7}	65	
1.8	35.1	21	123.6{12.6}	70	
1.9	45.6	24	141.0{14.4}	80	
1.3	6.2	3	29.4{ 3.0}	WH13—10	
1.5	9.3	4.5	44.1{ 4.5}	15	
1.6	12.3	6	58.8{ 6.0}	20	
1.6	12.3	7.5	73.5{ 7.5}	25	
1.7	15	9	88.3{ 9.0}	30	
1.7	15	10.5	103.0{10.5}	35	
1.8	19	12	117.7{12.0}	40	
1.9	25	13.5	132.4{13.5}	45	
1.9	25	15	147.1{15.0}	50	
2.0	30	16.5	161.8{16.5}	55	
2.0	30	18	176.5{18.0}	60	
2.1	39	19.5	191.2{19.5}	65	
2.1	39	21	205.9{21.0}	70	Quotation
2.1	39	24	235.4{24.0}	80	
1.6	10.4	4.5	44.1{ 4.5}	WH14—15	
1.6	10.4	6	58.8{ 6.0}	20	
1.6	10.4	7.5	73.5{ 7.5}	25	
1.7	12.8	9	88.3{ 9.0}	30	
1.7	12.8	10.5	103.0{10.5}	35	
1.9	20	12	117.7{12.0}	40	
1.9	20	13.5	132.4{13.5}	45	
2.1	30.5	15	147.1{15.0}	50	
2.1	30.5	16.5	161.8{16.5}	55	
2.1	30.5	18	176.5{18.0}	60	
2.2	37.4	19.5	191.2{19.5}	65	
2.2	37.4	21	205.9{21.0}	70	
2.3	47.2	24	235.4{24.0}	80	
1.7	10.2	4.5	44.1{ 4.5}	WH16—15	
1.8	12.6	6	58.8{ 6.0}	20	
1.9	14.5	7.5	73.5{ 7.5}	25	
1.9	14.5	9	88.3{ 9.0}	30	
2.0	18	10.5	103.0{10.5}	35	
2.1	21	12	117.7{12.0}	40	
2.2	26	13.5	132.4{13.5}	45	
2.2	26	15	147.1{15.0}	50	
2.2	26	16.5	161.8{16.5}	55	
2.3	32	18	176.5{18.0}	60	
2.3	32	19.5	191.2{19.5}	65	
2.4	38	21	205.9{21.0}	70	
2.5	47.5	24	235.4{24.0}	80	

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
2.1	12.6	6	88.3{ 9.0}	WH18—20	
2.2	15.4	7.5	109.8{11.2}	25	
2.2	15.4	9	132.4{13.5}	30	
2.3	18.4	10.5	154.0{15.7}	35	
2.4	21.6	12	176.5{18.0}	40	
2.5	25	13.5	199.1{20.3}	45	
2.5	25	15	220.6{22.5}	50	
2.6	30	16.5	242.2{24.7}	55	
2.6	30	18	264.8{27.0}	60	
2.8	42	19.5	286.4{29.2}	65	
2.8	42	21	308.9{31.5}	70	
2.9	49.3	24	353.0{36.0}	80	
3.0	57	26.1	397.2{40.5}	(90)	
3.0	57	24	441.3{45.0}	(100)	
2.2	12.7	6	88.3{ 9.0}	WH20—20	
2.3	15	7.5	109.8{11.2}	25	
2.3	15	9	132.4{13.5}	30	
2.5	20	10.5	154.0{15.7}	35	
2.5	20	12	176.5{18.0}	40	
2.5	20	13.5	199.1{20.3}	45	
2.6	22.8	15	220.6{22.5}	50	
2.6	22.8	16.5	242.2{24.7}	55	
2.8	30.8	18	264.8{27.0}	60	
2.8	30.8	19.5	286.4{29.2}	65	
3.0	42	21	308.9{31.5}	70	
3.0	42	24	353.0{36.0}	80	Quotation
3.2	56.8	27	397.2{40.5}	90	
3.2	56.8	30	441.3{45.0}	100	
2.3	12.7	6	88.3{ 9.0}	WH22—20	
2.5	16.7	7.5	109.8{11.2}	25	
2.5	16.7	9	132.4{13.5}	30	
2.6	18.2	10.5	154.0{15.7}	35	
2.8	25	12	176.5{18.0}	40	
2.8	25	13.5	199.1{20.3}	45	
2.8	25	15	220.6{22.5}	50	
3.0	33	16.5	242.2{24.7}	55	
3.0	33	18	264.8{27.0}	60	
3.0	33	19.5	286.4{29.2}	65	
3.2	43	21	308.9{31.5}	70	
3.2	43	24	353.0{36.0}	80	
3.2	43	26.1	397.2{40.5}	(90)	
3.5	64.4	26	441.3{45.0}	(100)	
2.8	16.8	9	132.4{13.5}	WH27—30	
2.8	16.8	10.5	154.0{15.7}	35	
2.9	18.8	12	176.5{18.0}	40	
2.9	19.4	13.5	199.1{20.3}	45	
3.2	25.5	15	220.6{22.5}	50	
3.2	25.5	16.5	242.2{24.7}	55	
3.5	35.5	18	264.8{27.0}	60	
3.5	35.5	19.5	286.4{29.2}	65	
3.5	35.5	21	308.9{31.5}	70	
3.5	35.5	24	353.0{36.0}	80	
3.5	35.5	27	397.2{40.5}	90	
4.0	68	30	441.3{45.0}	100	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- The solid height values are for reference only.
  There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide **P.1219**
- Instructions and notes for coil springs **P.1221**

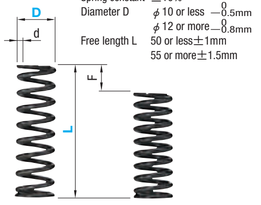
(L) size allowable deflection
WH5—30 Fmax.=L×25%
WH5—35 Fmax.=L×25%
WH5—40 Fmax.=L×22%
WH6—45 Fmax.=L×25%
WH6—50 Fmax.=L×20%
WH6—55 Fmax.=L×26%
WH6—60 Fmax.=L×23%
WH6—65 Fmax.=L×21%
WH6—70 Fmax.=L×21%
WH8—65 Fmax.=L×26%
WH 8— 70 Fmax.=L×27%
WH18— 90 Fmax.=L×29%
WH18— 100 Fmax.=L×24%
WH22— 90 Fmax.=L×29%
WH22— 100 Fmax.=L×26%

No grinding on both ends of WH type springs marked with *.

WIRE SPRINGS

—WB (25% DEFLECTION)—

WB



RoHS

Spring constant ±10%
Diameter D ϕ10 or less $^{0}_{-0.5}$mm
ϕ12 or more $^{0}_{-0.8}$mm
Free length L 50 or less±1mm
55 or more±1.5mm

M SWP—A

■Spring constant

D \ Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5{0.05}				
3	N/mm 0.1 {kgf/mm} {0.01}	N/mm 0.3 {kgf/mm} {0.03}	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	1.5 {0.15}	2.0 {0.2}		3.9{0.4}
4							2.9{0.3}	4.9{0.5}
5					N/mm 2.0 {kgf/mm} {0.2}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}	N/mm 9.8 {kgf/mm} {1.0}
6								
8								
10	N/mm 0.2 {kgf/mm} {0.02}							
12								
13							N/mm 9.8 {kgf/mm} {1.0}	N/mm 19.6 {kgf/mm} {2.0}
14								
16								
18		N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	N/mm 2.9 {kgf/mm} {0.3}	N/mm 3.9 {kgf/mm} {0.4}	N/mm 4.9 {kgf/mm} {0.5}	N/mm 14.7 {kgf/mm} {1.5}	29.4{3.0}
20								29.4 {3.0}
22								
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

■WB:Fmax. (allowable deflection)=L×25%

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
0.4	3.2	1.3	4.9{ 0.5}	WB 3— 5*	
0.5	6.5	2.5	9.8{ 1.0}	10*	
0.55	10.5	3.8	14.7{ 1.5}	15*	
0.55	12.7	5	19.6{ 2.0}	20*	
0.6	17.4	6.3	24.5{ 2.5}	25*	
0.6	21.0	7.5	29.4{ 3.0}	30*	
0.65	24.0	8.8	34.3{ 3.5}	35*	
0.65	27.0	10	39.2{ 4.0}	40*	
0.5	3	1.3	5.9{ 0.6}	WB 4— 5*	
0.6	6	2.5	12.3{ 1.3}	10	
0.65	9.8	3.8	18.1{ 1.9}	15	
0.7	12.6	5	24.5{ 2.5}	20	
0.75	16.5	6.3	30.4{ 3.1}	25	
0.75	20.3	7.5	36.8{ 3.8}	30	
0.8	24	8.8	43.1{ 4.4}	35	
0.8	28	10	49.0{ 5.0}	40	
0.8	29	11.3	55.4{ 5.7}	45	
0.85	34	12.5	61.3{ 6.3}	50	
0.65	3.3	1.3	12.7{ 1.3}	WB 5— 5*	
0.8	7	2.5	24.5{ 2.5}	10	
0.8	7	3.8	37.3{ 3.8}	15	
0.9	13	5	49.0{ 5.0}	20	
0.9	13	6.3	61.8{ 6.3}	25	
1.0	21	7.5	73.5{ 7.5}	30	
1.0	25	8.8	86.3{ 8.8}	35	
1.0	25	10	98.1{10.0}	40	
1.1	31	11.3	110.8{11.3}	45	
1.1	34	12.5	122.6{12.5}	50	
1.1	39	13.8	135.3{13.8}	55	
1.1	43	15	147.1{15.0}	60	
1.2	46	16.3	159.8{16.3}	65	Quotation
1.2	50	17.5	171.6{17.5}	70	
0.7	3.5	1.3	12.7{ 1.3}	WB 6— 5*	
0.8	7	2.5	24.5{ 2.5}	10	
0.9	7.5	3.8	37.3{ 3.8}	15	
1.0	11.5	5	49.0{ 5.0}	20	
1.1	17.5	6.3	61.8{ 6.3}	25	
1.1	19.5	7.5	73.5{ 7.5}	30	
1.1	20	8.8	86.3{ 8.8}	35	
1.2	28	10	98.1{10.0}	40	
1.2	30	11.3	110.8{11.3}	45	
1.2	32	12.5	122.6{12.5}	50	
1.2	32	13.8	135.3{13.8}	55	
1.3	43	15	147.1{15.0}	60	
1.3	46	16.3	159.8{16.3}	65	
1.3	50	17.5	171.6{17.5}	70	
1.4	57	20	196.1{20.0}	80	
1.0	6	2.5	24.5{ 2.5}	WB 8—10	
1.2	10.8	3.8	37.3{ 3.8}	15	
1.2	11.5	5	49.0{ 5.0}	20	
1.3	17	6.3	61.8{ 6.3}	25	
1.3	17	7.5	73.5{ 7.5}	30	
1.4	24.5	8.8	86.3{ 8.8}	35	
1.4	25.2	10	98.1{10.0}	40	
1.5	32	11.3	110.8{11.3}	45	
1.5	33	12.5	122.6{12.5}	50	
1.5	36.5	13.8	135.3{13.8}	55	
1.5	36.5	15	147.1{15.0}	60	
1.6	48	16.3	159.8{16.3}	65	
1.6	48	17.5	171.6{17.5}	70	
1.6	55	20	196.1{20.0}	80	

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
1.2	6	2.5	24.5{ 2.5}	WB10— 10	
1.3	8.5	3.8	37.3{ 3.8}	15	
1.4	12	5	49.0{ 5.0}	20	
1.5	16.5	6.3	61.8{ 6.3}	25	
1.5	17	7.5	73.5{ 7.5}	30	
1.6	23	8.8	86.3{ 8.8}	35	
1.6	24	10	98.1{10.0}	40	
1.7	30	11.3	110.8{11.3}	45	
1.7	31.5	12.5	122.6{12.5}	50	
1.8	40	13.8	135.3{13.8}	55	
1.8	40	15	147.1{15.0}	60	
1.8	43	16.3	159.8{16.3}	65	
1.8	43	17.5	171.6{17.5}	70	
1.8	54	20	196.1{20.0}	80	
1.4	6.5	2.5	24.5{ 2.5}	WB12— 10	
1.4	7.7	3.8	36.3{ 3.7}	15	
1.6	12.5	5	49.0{ 5.0}	20	
1.6	13.6	6.3	60.8{ 6.2}	25	
1.7	18	7.5	73.5{ 7.5}	30	
1.8	22.5	8.8	85.3{ 8.7}	35	
1.8	24	10	98.1{10.0}	40	
1.8	24	11.3	109.8{11.2}	45	
2.0	34	12.5	122.6{12.5}	50	
2.0	38	13.8	134.4{13.7}	55	
2.0	40	15	147.1{15.0}	60	
2.0	42	16.3	158.9{16.2}	65	
2.1	48.5	17.5	171.6{17.5}	70	
2.1	52.5	20	196.1{20.0}	80	Quotation
1.6	6.4	2.5	49.0{ 5.0}	WB13— 10	
1.8	11	3.8	74.5{ 7.6}	15	
1.8	11	5	98.1{10.0}	20	
2.0	17	6.3	123.6{12.6}	25	
2.0	18	7.5	147.1{15.0}	30	
2.1	22	8.8	172.6{17.6}	35	
2.1	22	10	196.1{20.0}	40	
2.3	32	11.3	221.6{22.6}	45	
2.3	32	12.5	245.2{25.0}	50	
2.4	40	13.8	270.7{27.6}	55	
2.4	42	15	294.2{30.0}	60	
2.4	42	16.3	319.7{32.6}	65	
2.5	50	17.5	343.2{35.0}	70	
2.5	50	20	392.3{40.0}	80	
1.8	9	3.8	72.6{ 7.4}	WB14— 15	
2.0	13	5	98.1{10.0}	20	
2.0	14	6.3	121.6{12.4}	25	
2.1	18	7.5	147.1{15.0}	30	
2.1	23	8.8	170.6{17.4}	35	
2.3	26.3	10	196.1{20.0}	40	
2.3	27.6	11.3	219.7{22.4}	45	
2.4	31	12.5	245.2{25.0}	50	
2.5	37.5	13.8	268.7{27.4}	55	
2.5	41	15	294.2{30.0}	60	
2.5	43.5	16.3	317.7{32.4}	65	
2.6	48	17.5	343.2{35.0}	70	
2.6	52	20	392.3{40.0}	80	

d	Solid Height	F max.	Load N{kgf} max.	Part Number Type D — L	U/Price
2.0	10	3.8	74.5{ 7.6}	WB16— 15	
2.1	12.5	5	98.1{10.0}	20	
2.3	17	6.3	123.6{12.6}	25	
2.3	18.5	7.5	147.1{15.0}	30	
2.4	21.5	8.8	172.6{17.6}	35	
2.4	21.5	10	196.1{20.0}	40	
2.5	27.5	11.3	221.6{22.6}	45	
2.5	27.5	12.5	245.2{25.0}	50	
2.6	32	13.8	270.7{27.6}	55	
2.6	32	15	294.2{30.0}	60	
2.8	46	16.3	319.7{32.6}	65	
2.8	46	17.5	343.2{35.0}	70	
2.9	55	20	392.3{40.0}	80	
2.5	13.5	5	147.1{15.0}	WB18— 20	
2.6	17	6.3	185.3{18.9}	25	
2.6	17	7.5	220.6{22.5}	30	
2.8	23.5	8.8	258.9{26.4}	35	
2.9	27.5	10	294.2{30.0}	40	
2.9	27.5	11.3	332.4{33.9}	45	
3.0	33	12.5	367.7{37.5}	50	
3.0	33	13.8	406.0{41.4}	55	
3.2	43	15	441.3{45.0}	60	
3.2	44.5	16.3	479.5{48.9}	65	
3.2	44.5	17.5	514.8{52.5}	70	
3.4	58	20	588.4{60.0}	80	
3.4	61	22.5	661.9{67.5}	90	Quotation
3.5	71	25	735.5{75.0}	100	
2.8	13.5	5	147.1{15.0}	WB22— 20	
2.9	16	6.3	185.3{18.9}	25	
3.0	18	7.5	220.6{22.5}	30	
3.0	18	8.8	258.9{26.4}	35	
3.2	24	10	294.2{30.0}	40	
3.2	24	11.3	332.4{33.9}	45	
3.5	36	12.5	367.7{37.5}	50	
3.5	36	13.8	406.0{41.4}	55	
3.5	36	15	441.3{45.0}	60	
3.6	45	16.3	479.5{48.9}	65	
3.6	45	17.5	514.8{52.5}	70	
3.8	57	20	588.4{60.0}	80	
3.8	57	22.5	661.9{67.5}	90	
4.0	72	25	735.5{75.0}	100	
3.5	19	7.5	220.6{22.5}	WB27— 30	
3.6	21	8.8	258.9{26.4}	35	
3.6	21	10	294.2{30.0}	40	
3.8	30	11.3	332.4{33.9}	45	
3.8	30	12.5	367.7{37.5}	50	
4.0	38	13.8	406.0{41.4}	55	
4.0	38	15	441.3{45.0}	60	
4.0	38	16.3	479.5{48.9}	65	
4.0	38	17.5	514.8{52.5}	70	
4.5	57	20	588.4{60.0}	80	
4.5	63	22.5	661.9{67.5}	90	
4.5	67	25	735.5{75.0}	100	

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- No grinding on both ends of WB type springs marked with *.
- The solid height values are for reference only.
  There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide P.1219
- Instructions and notes for coil springs P.1221

Order Part Number
WB13—60

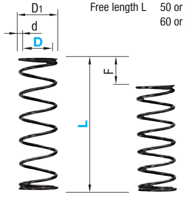
Days to Ship Quotation

Price Quotation

WIRE SPRINGS

—NWL・NWM (INNER DIAMETER STANDARD TYPE)／WP(70% DEFLECTION LONG TYPE)—

NWL
NWM



RoHS

Spring constant ±10%
Diameter D ϕ 8.5 or less ±0.3mm
ϕ10.6 or more±0.4mm
Free length L 50 or less±1mm
60 or more±2mm

M SWP—A

Order Part Number
NWL6.5—50
NWM6.5—50

Days to Ship Quotation

Price Quotation

■Characteristics

The NWL/NWM Wire Springs feature a consistent spring constant based on their inner diameters. The load value is the same for all springs with a given inner diameter.

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- The solid height values are for reference only. There may be some dispersions depending on the lot.
- Times used: 1 million
- Product guide P.1219
- Instructions and notes for coil springs P.1221

■NWL:Fmax.(allowable deflection)=L×40%

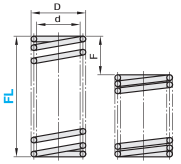
Pin dia.	D	D1	d	F max.	Solid Height	Load N{kgf} max.	Spring constant N/mm {kgf/mm}	Part Number Type D — L	U/Price
5	5.5	7	0.75	12	10.9	13.7{1.4}	1.1{0.12}	NWL 5.5— 30	
				14	12		1.0{0.10}	35	
				16	13.5		0.9{0.09}	40	
				18	15		0.8{0.08}	45	
				20	16.5		0.7{0.07}	50	
6	6.5	8.1	0.8	12	9.6	13.7{1.4}	1.1{0.12}	NWL 6.5— 30	
				14	10.8		1.0{0.10}	35	
				16	12		0.9{0.09}	40	
				18	13.2		0.8{0.08}	45	
				20	14.4		0.7{0.07}	50	
8	8.5	10.5	1.0	12	9.8	20.6{2.1}	1.7{0.18}	NWL 8.5— 30	
				14	10.8		1.5{0.15}	35	
				16	12		1.3{0.13}	40	
				18	13		1.1{0.12}	45	
				20	14		1.0{0.11}	50	
				24	16.5		0.9{0.09}	60	Quotation
10	10.6	12.8	1.1	12	9.1	20.6{2.1}	1.7{0.18}	NWL 10.6— 30	
				14	9.9		1.5{0.15}	35	
				16	11		1.3{0.13}	40	
				18	12.1		1.1{0.12}	45	
				20	12.7		1.0{0.11}	50	
				24	14.9		0.9{0.09}	60	
13	13.6	16.4	1.4	14	12.3	27.5{2.8}	2.0{0.20}	NWL 13.6— 35	
				16	13.3		1.7{0.18}	40	
				18	14.7		1.5{0.16}	45	
				20	15.8		1.4{0.14}	50	
				24	18.2		1.1{0.12}	60	
16	16.6	19.8	1.6	14	13.6	27.5{2.8}	2.0{0.20}	NWL 16.6— 35	
				16	14.8		1.7{0.18}	40	
				18	16		1.5{0.16}	45	
				20	17.2		1.4{0.14}	50	
				24	20		1.1{0.12}	60	

■NWM:Fmax.(allowable deflection)=L×32%

Pin dia.	D	D1	d	F max.	Solid Height	Load N{kgf} max.	Spring constant N/mm {kgf/mm}	Part Number Type D — L	U/Price
5	5.5	7.3	0.9	9.6	13.1	20.6{2.1}	2.1{0.22}	NWM 5.5— 30	
				11.2	14.9		1.8{0.19}	35	
				12.8	16.2		1.6{0.16}	40	
				14.4	18		1.4{0.15}	45	
				16	19.8		1.3{0.13}	50	
6	6.5	8.5	1.0	9.6	14	20.6{2.1}	2.1{0.22}	NWM 6.5— 30	
				11.2	15.5		1.8{0.19}	35	
				12.8	17.5		1.6{0.16}	40	
				14.4	19.5		1.4{0.15}	45	
				16	21		1.3{0.13}	50	
8	8.5	10.7	1.1	9.6	9.4	27.5{2.8}	2.9{0.29}	NWM 8.5— 30	
				11.2	10.5		2.5{0.25}	35	
				12.8	11.6		2.1{0.22}	40	
				14.4	12.7		1.9{0.19}	45	
				16	13.8		1.7{0.18}	50	
				19.2	16		1.4{0.15}	60	Quotation
10	10.6	13.2	1.3	9.6	11.4	27.5{2.8}	2.9{0.29}	NWM 10.6— 30	
				11.2	12.7		2.5{0.25}	35	
				12.8	14		2.1{0.22}	40	
				14.4	15.3		1.9{0.19}	45	
				16	16.6		1.7{0.18}	50	
				19.2	19.2		1.4{0.15}	60	
13	13.6	16.8	1.6	11.2	14.4	34.3{3.5}	3.1{0.31}	NWM 13.6— 35	
				12.8	15.6		2.7{0.27}	40	
				14.4	17.2		2.4{0.24}	45	
				16	18.4		2.1{0.22}	50	
				19.2	20.8		1.8{0.18}	60	
16	16.6	20.2	1.8	11.2	15.3	34.3{3.5}	3.1{0.31}	NWM 16.6— 35	
				12.8	16.7		2.7{0.27}	40	
				14.4	18.5		2.4{0.24}	45	
				16	19.4		2.1{0.22}	50	
				19.2	22.5		1.8{0.18}	60	

■WP (Long type)

WP



RoHS

FL	Tolerance
100～150	$^{+10}_{0}$
175～250	$^{+15}_{0}$
300・500	$^{+25}_{-10}$

Order Part Number
WP13—100

Days to Ship Quotation

Price Quotation

d	D	Wire dia.	Solid Height	Spring constant N/mm{kgf/mm}	F=L×70% Fmm	F=L×70% LoadN{kgf}	Part Number Type No.—FL	U/Price 1～9.
8.5 More	11.5 Less	0.9	23	0.30{0.031}	70	21.3{2.2}	WP 8— 100	
			28	0.27{0.028}	87.5	24.0{2.5}	125	
			33	0.23{0.023}	105	23.7{2.4}	150	
			40	0.18{0.018}	122.5	21.6{2.2}	175	
			46	0.16{0.016}	140	22.0{2.2}	200	
			55	0.12{0.012}	175	20.6{2.1}	250	
			71	0.10{0.010}	210	20.6{2.1}	300	
			118	0.06{0.006}	350	20.6{2.1}	500	
10.5 More	13.5 Less	1.0	23	0.37{0.038}	70	26.1{2.7}	WP 10— 100	
			30	0.27{0.028}	87.5	24.0{2.5}	125	
			35	0.24{0.024}	105	24.7{2.5}	150	
			40	0.20{0.020}	122.5	24.0{2.5}	175	Quotation
			45	0.18{0.018}	140	24.7{2.5}	200	
			56	0.15{0.015}	175	25.7{2.6}	250	
			64	0.12{0.012}	210	24.7{2.5}	300	
			106	0.08{0.008}	350	27.5{2.8}	500	
13.5 More	17 Less	1.2	17	0.59{0.060}	70	41.2{4.2}	WP 13— 100	
			22	0.42{0.043}	87.5	36.9{3.8}	125	
			26	0.31{0.032}	105	33.0{3.4}	150	
			34	0.25{0.025}	122.5	30.0{3.1}	175	
			37	0.23{0.023}	140	31.6{3.2}	200	
			42	0.19{0.019}	175	32.6{3.3}	250	
			53	0.15{0.015}	210	30.9{3.2}	300	
			80	0.10{0.010}	350	34.3{3.5}	500	

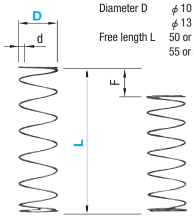
•Load {kgf}=Load N×0.101972

HEAT PROOF WIRE SPRINGS

—WFH (60% DEFLECTION) • WLH (50% DEFLECTION)— ●Heat resistant up to 200℃

Non JIS material definition is listed on P.1351 - 1352

WFH
WLH



RoHS

Spring constant ±10%
Diameter D ϕ10 or less $^{0}_{-0.5}$mm
ϕ13 or more $^{0}_{-0.8}$mm
Free length L 50 or less±1mm
55 or more±1.5mm

M SUS631

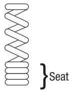
■Spring constant

Type D	WFH	WLH	WMH	WHH
4	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	2.0{0.2}	2.9{0.3}
5				
6			N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}
8				
10				
13				N/mm 9.8 {kgf/mm} {1.0}
16				
18	1.0{0.1}	2.9{0.3}	4.9{0.5}	14.7{1.5}
Fmax.	F=L×60%	F=L×50%	F=L×40%	F=L×35%

☎ Order	Part Number	WFH13—60 WLH13—60
Days to Ship	Quotation	
P Price	Quotation	

●N (load)=N/mm (spring constant)×Fmm (deflection)
Load {kgf}=Load N×0.101972

- No grinding on both ends of springs marked with *.
- The solid height values are for reference only. There may be some dispersions depending on the lot.
- Times used: 1 million
- Instructions and notes for coil springs P.1221
- Coil springs marked with ● have spring seat(s) on one end or both ends in order to reduce excessive stress or potential breakage when deflecting. (The seat becomes 4 rolling extent from 0.5)) Solid height/spring constant values are the same as those without spring seats.



■WFH:Fmax.(allowable deflection)=L×60%

Fmax.(Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

d	Solid Height	F max.	N{kgf} max.	Part Number Type D — L	U/Price 1~19
0.29	1.8	3	1.5{0.15}	WFH4— 5*	Quotation
0.35	3.2	6	2.9{0.3 }	10*	
0.35	3.2	9	4.4{0.45}	15*	
0.4	5.2	12	5.9{0.6 }	20*	
0.4	6	15	7.4{0.75}	25*	
0.4	6.8	18	8.8{0.9 }	30*	
0.45	10.4	21	10.3{1.05}	35*	
0.45	11.3	24	11.8{1.2 }	40*	
0.3	1.2	3	1.5{0.15}	WFH5— 5*	
0.4	3.2	6	2.9{0.3 }	10*	
0.4	3.2	9	4.4{0.45}	15*	
0.45	5.5	12	5.9{0.6 }	20	
0.45	6.3	15	7.4{0.75}	25	
0.5	8	18	8.8{0.9 }	30	
0.5	9.5	21	10.3{1.05}	35	
0.5	9.5	24	11.8{1.2 }	40	
0.55	13.0	27	13.2{1.35}	45	
0.55	13.7	30	14.7{1.5 }	50	
0.35	1.4	3	1.5{0.15}	WFH6— 5*	
0.45	3.2	6	2.9{0.3 }	10*	
0.45	3.2	9	4.4{0.45}	15*	
0.5	5.5	12	5.9{0.6 }	20	
0.5	5.5	15	7.4{0.75}	25	
0.6	10	18	8.8{0.9 }	30	
0.6	10	21	10.3{1.05}	35	
0.6	11	24	11.8{1.2 }	40	
0.6	11.5	27	13.2{1.35}	45	
0.65	15	30	14.7{1.5 }	50	
0.65	17	33	16.2{1.65}	55	
0.65	17	36	17.7{1.8 }	60	
0.7	23	39	19.1{1.95}	65	
0.7	23	42	20.6{2.1 }	70	
0.7	24	48	23.5{2.4 }	80	
0.5	2.8	6	2.9{0.3 }	WFH 8—10	Quotation
0.5	3	9	4.4{0.45}	15	
0.6	5.3	12	5.9{0.6 }	20	
0.6	5.3	15	7.4{0.75}	25	
0.65	7.3	18	8.8{0.9 }	30	
0.65	7.3	21	10.3{1.05}	35	
0.7	10	24	11.8{1.2 }	40	
0.7	10	27	13.2{1.35}	45	
0.7	10.5	30	14.7{1.5 }	50	
0.8	18	33	16.2{1.65}	55	
0.8	18	36	17.7{1.8 }	60	
0.8	20	39	19.1{1.95}	65	
0.8	20	42	20.6{2.1 }	70	
0.8	21	48	23.5{2.4 }	80	
0.6	3	6	2.9{0.3 }	WFH10—10	
0.6	3.2	9	4.4{0.45}	15	
0.7	5.3	12	5.9{0.6 }	20	
0.7	5.3	15	7.4{0.75}	25	
0.7	5.6	18	8.8{0.9 }	30	
0.8	10	21	10.3{1.05}	35	
0.8	10	24	11.8{1.2 }	40	
0.8	10.5	27	13.2{1.35}	45	
0.8	10.5	30	14.7{1.5 }	50	
0.8	11	33	16.2{1.65}	55	
0.9	17.6	36	17.7{1.8 }	60	
0.9	18	39	19.1{1.95}	65	
0.9	18	42	20.6{2.1 }	70	
0.9	19	48	23.5{2.4 }	80	
0.7	3.5	9	4.4{0.45}	WFH13—15	
0.8	5	12	5.9{0.6 }	20	
0.8	5	15	7.4{0.75}	25	
0.8	5	18	8.8{0.9 }	30	
0.9	7.7	21	10.3{1.05}	35	
0.9	7.7	24	11.8{1.2 }	40	
0.9	8.6	27	13.2{1.35}	45	
0.9	8.6	30	14.7{1.5 }	50	
1.0	12.5	33	16.2{1.65}	55	
1.0	13.5	36	17.7{1.8 }	60	
1.0	13.5	39	19.1{1.95}	65	
1.1	20	42	20.6{2.1 }	70	
1.1	20	48	23.5{2.4 }	80	
1.1	21	54	26.5{2.7 }	90	
0.8	3.6	9	4.4{0.45}	WFH16—15	Quotation
0.9	5.3	12	5.9{0.6 }	20	
0.9	5.3	15	7.4{0.75}	25	
1.0	8	18	8.8{0.9 }	30	
1.0	8	21	10.3{1.05}	35	
1.0	9	24	11.8{1.2 }	40	
1.0	9	27	13.2{1.35}	45	
1.0	9	30	14.7{1.5 }	50	
1.0	9	33	16.2{1.65}	55	
1.1	12	36	17.7{1.8 }	60	
1.1	12	39	19.1{1.95}	65	
1.2	17	42	20.6{2.1 }	70	
1.2	17	48	23.5{2.4 }	80	
1.2	17	54	26.5{2.7 }	90	
1.0	5	12	11.8{1.2 }	WFH18—20	
1.1	5.5	15	14.7{1.5 }	25	
1.1	5.5	18	17.7{1.8 }	30	
1.2	8	21	20.6{2.1 }	35	
1.2	8	24	23.5{2.4 }	40	
1.2	8	27	26.5{2.7 }	45	
1.4	14	30	29.4{3.0 }	50	
1.4	14	33	32.4{3.3 }	55	
1.4	14	36	35.3{3.6 }	60	
1.4	14	39	38.2{3.9 }	65	
1.5	20	42	41.2{4.2 }	70	
1.5	20	48	47.1{4.8 }	80	
1.6	26	54	53.0{5.4 }	90	
1.6	26	60	58.8{6.0 }	100	

■WLH:Fmax.(allowable deflection)=L×50%

Fmax.(Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

d	Solid Height	F max.	N{kgf} max.	Part Number Type D — L	U/Price 1~19
0.35	2.1	2.5	2.5{0.25}	WLH4— 5*	Quotation
0.4	3.6	5	4.9{0.5 }	10*	
0.45	5	7.5	7.4{0.75}	15*	
0.5	8.5	10	9.8{1.0 }	20	
0.5	9	12.5	12.3{1.25}	25	
0.5	10.5	15	14.7{1.5 }	30	
0.55	12	17.5	17.2{1.75}	35	
0.55	16	20	19.6{2.0 }	40	
0.4	1.8	2.5	2.5{0.25}	WLH5— 5*	
0.45	3.2	5	4.9{0.5 }	10*	
0.5	5	7.5	7.4{0.75}	15	
0.55	6.6	10	9.8{1.0 }	20	
0.6	10	12.5	12.3{1.3 }	25	
0.6	12	15	14.7{1.5 }	30	
0.65	14.3	17.5	17.2{1.8 }	35	
0.65	16.3	20	19.6{2.0 }	40	
0.65	17.6	22.5	22.1{2.3 }	45	
0.7	21	25	24.5{2.5 }	50	
0.5	2.2	2.5	2.9{0.3 }	WLH6— 5*	
0.5	3.3	5	4.9{0.5 }	10	
0.6	6.5	7.5	7.8{0.8 }	15	
0.6	8.5	10	9.8{1.0 }	20•	
0.6	10	12.5	12.7{1.3 }	25•	
0.7	13	15	14.7{1.5 }	30	
0.7	15	17.5	17.7{1.8 }	35•	
0.7	17	20	19.6{2.0 }	40•	
0.7	20	22.5	22.6{2.3 }	45•	
0.8	23.5	25	24.5{2.5 }	50	
0.8	23.5	27.5	27.0{2.8 }	55	
0.8	27	30	29.4{3.0 }	60•	
0.8	27	32.5	31.9{3.3 }	65	
0.8	31	35	34.3{3.5 }	70•	
0.8	35	40	39.2{4.0 }	80	
0.6	3.5	5	4.9{0.5}	WLH 8—10	Quotation
0.7	6	7.5	7.8{0.8}	15	
0.7	7.5	10	9.8{1.0}	20	
0.8	10	12.5	12.7{1.3}	25	
0.8	12	15	14.7{1.5}	30•	
0.8	15	17.5	17.7{1.8}	35•	
0.9	17.5	20	19.6{2.0}	40	
0.9	19.5	22.5	22.6{2.3}	45•	
0.9	21	25	24.5{2.5}	50•	
0.9	20	27.5	27.0{2.8}	55•	
0.9	25	30	29.4{3.0}	60•	
1.0	29	32.5	31.9{3.3}	65	
1.0	30.5	35	34.3{3.5}	70•	
1.0	35	40	39.2{4.0}	80•	
0.7	4	5	4.9{0.5}	WLH10—10	
0.8	6	7.5	7.8{0.8}	15	
0.9	8.5	10	9.8{1.0}	20	
0.9	9.5	12.5	12.7{1.3}	25	
0.9	11.5	15	14.7{1.5}	30•	
1.0	15	17.5	17.7{1.8}	35	
1.0	17.5	20	19.6{2.0}	40•	
1.0	20	22.5	22.6{2.3}	45•	
1.0	22.5	25	24.5{2.5}	50•	
1.1	23	27.5	27.0{2.8}	55	
1.1	24	30	29.4{3.0}	60•	
1.1	25.5	32.5	31.9{3.3}	65•	
1.1	28	35	34.3{3.5}	70•	
1.2	36	40	39.2{4.0}	80	
0.9	5.2	7.5	7.8{0.8}	WLH13—15	
1.0	7.5	10	9.8{1.0}	20	
1.0	7.5	12.5	12.7{1.3}	25	
1.1	10.5	15	14.7{1.5}	30	
1.1	11	17.5	17.7{1.8}	35	
1.2	17	20	19.6{2.0}	40	
1.2	17	22.5	22.6{2.3}	45	
1.2	20	25	24.5{2.5}	50•	
1.2	21	27.5	27.0{2.8}	55•	
1.2	22	30	29.4{3.0}	60•	
1.2	22	32.5	31.9{3.3}	65•	
1.2	25	35	34.3{3.5}	70•	
1.4	35	40	39.2{4.0}	80	
1.4	40	45	44.1{4.5}	90	
1.0	5.5	7.5	7.8{ 0.8 }	WLH16—15	Quotation
1.1	7.5	10	9.8{ 1.0 }	20	
1.2	10	12.5	12.7{ 1.3 }	25	
1.2	12.5	15	14.7{ 1.5 }	30•	
1.2	13	17.5	17.7{ 1.8 }	35•	
1.2	15	20	19.6{ 2.0 }	40•	
1.4	19.5	22.5	22.6{ 2.3 }	45	
1.4	22	25	24.5{ 2.5 }	50•	
1.4	23	27.5	27.0{ 2.8 }	55•	
1.4	25	30	29.4{ 3.0 }	60•	
1.4	25	32.5	31.9{ 3.3 }	65•	
1.4	29	35	34.3{ 3.5 }	70•	
1.6	36	40	39.2{ 4.0 }	80	
1.6	37	45	44.1{ 4.5 }	90•	
1.4	7	10	29.4{ 3.0 }	WLH18—20	
1.6	10.5	12.5	37.3{ 3.8 }	25	
1.6	13	15	44.1{ 4.5 }	30•	
1.8	15	17.5	52.0{ 5.3 }	35•	
1.8	17	20	58.8{ 6.0 }	40	
1.8	20	22.5	66.7{ 6.8 }	45•	
2	22	25	73.5{ 7.5 }	50•	
1.8	19	27.5	80.9{ 8.25}	55	
2	28	30	88.3{ 9.0 }	60	
2	28	32.5	95.6{ 9.75}	65	
2	31	35	103.0{10.5 }	70•	
2	35	40	117.7{12.0 }	80•	
2	40	45	132.4{13.5 }	90•	
2.1	47	50	147.1{15.0 }	100	

HEAT PROOF WIRE SPRINGS

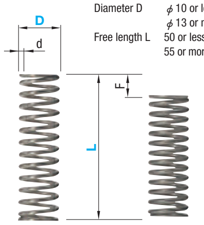
—WMH (40% DEFLECTION) • WHH (35% DEFLECTION)— ●Heat resistant up to 200℃

Non JIS material definition is listed on P.1351 - 1352

WMH
WHH

RoHS

Spring constant ±10%
Diameter D ϕ10 or less $^{0}_{-0.5}$mm
ϕ13 or more $^{0}_{-0.8}$mm
Free length L 50 or less±1mm
55 or more±1.5mm



M SUS631

■Spring constant

D \ Type	WFH	WLH	WMH	WHH
4	N/mm 0.5 {kgf/mm} {0.05}	N/mm 1.0 {kgf/mm} {0.1}	2.0{0.2}	2.9{0.3}
5				
6			N/mm 2.9 {kgf/mm} {0.3}	N/mm 5.9 {kgf/mm} {0.6}
8				
10				
13				N/mm 9.8 {kgf/mm} {1.0}
16				
18	1.0{0.1}	2.9{0.3}	4.9{0.5}	14.7{1.5}
Fmax.	F=L×60%	F=L×50%	F=L×40%	F=L×35%

Order

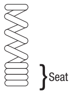
Part Number
WMH13—60
WHH13—60

Days to Ship **Quotation**

Price **Quotation**

●N (load)=N/mm (spring constant)×Fmm (deflection)
Load {kgf}=Load N×0.101972

- No grinding on both ends of springs marked with *.
- The solid height values are for reference only. There may be some dispersions depending on the lot.
- Times used: 1 million
- Instructions and notes for coil springs **P.1221**
- Coil springs marked with ● have spring seat(s) on one end or both ends in order to reduce excessive stress or potential breakage when deflecting.
(The seat becomes 4 rolling extent from 0.5))
Solid height/spring constant values are the same as those without spring seats.



■WMH:Fmax.(allowable deflection)=L×40%

Fmax.(Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

d	Solid Height	F max.	N{kgf} max.	Part Number Type D — L	U/Price 1~19
0.4	2	2	3.9{0.4}	WMH4— 5*	Quotation
0.5	5	4	7.8{0.8}	10*	
0.55	7.2	6	11.8{1.2}	15	
0.6	10	8	15.7{1.6}	20	
0.6	11.5	10	19.6{2.0}	25	
0.6	15	12	23.5{2.4}	30	
0.65	17.5	14	27.5{2.8}	35	
0.65	20	16	31.4{3.2}	40	
0.45	2.3	2	3.9{0.4}	WMH5— 5*	
0.6	5.4	4	7.8{0.8}	10*	
0.65	7.8	6	11.8{1.2}	15	
0.65	9.1	8	15.7{1.6}	20	
0.7	11.2	10	19.6{2.0}	25	
0.7	14	12	23.5{2.4}	30	
0.7	14	14	27.5{2.8}	35	
0.8	21.6	16	31.4{3.2}	40	
0.8	22.5	18	35.3{3.6}	45	
0.8	26	20	39.2{4.0}	50	
0.5	2	2	5.9{0.6}	WMH6— 5*	
0.7	5	4	11.8{1.2}	10	
0.7	8	6	17.7{1.8}	15●	
0.8	10	8	23.5{2.4}	20	
0.8	12	10	29.4{3.0}	25●	
0.9	16	12	35.3{3.6}	30	
0.9	18.5	14	41.2{4.2}	35●	
0.9	20.5	16	47.1{4.8}	40●	
0.9	25	18	53.0{5.4}	45●	
1.0	28	20	58.8{6.0}	50	
1.0	28	22	64.7{6.6}	55	
1.0	33	24	70.6{7.2}	60●	
1.0	33	26	76.5{7.8}	65●	
1.0	39	28	82.4{8.4}	70●	
1.1	44	32	94.1{9.6}	80	
0.8	4.5	4	11.8{ 1.2}	WMH 8—10	Quotation
0.9	7.5	6	17.7{ 1.8}	15	
0.9	9.5	8	23.5{ 2.4}	20●	
1.0	12	10	29.4{ 3.0}	25	
1.0	15	12	35.3{ 3.6}	30●	
1.1	18	14	41.2{ 4.2}	35	
1.1	21	16	47.1{ 4.8}	40●	
1.1	24	18	53.0{ 5.4}	45●	
1.2	27	20	58.8{ 6.0}	50	
1.2	28	22	64.7{ 6.6}	55	
1.2	32	24	70.6{ 7.2}	60	
1.2	32	26	76.5{ 7.8}	65●	
1.2	37	28	82.4{ 8.4}	70●	
1.2	44	32	94.1{ 9.6}	80●	
0.9	4.5	4	11.8{ 1.2}	WMH10—10	
1.0	6.5	6	17.7{ 1.8}	15	
1.1	9.5	8	23.5{ 2.4}	20	
1.1	12.5	10	29.4{ 3.0}	25●	
1.1	15	12	35.3{ 3.6}	30●	
1.2	18.5	14	41.2{ 4.2}	35	
1.2	20	16	47.1{ 4.8}	40●	
1.2	22	18	53.0{ 5.4}	45●	
1.2	24	20	58.8{ 6.0}	50●	
1.4	27	22	64.7{ 6.6}	55	
1.4	31	24	70.6{ 7.2}	60	
1.4	32	26	76.5{ 7.8}	65	
1.4	34	28	82.4{ 8.4}	70●	
1.4	35	32	94.1{ 9.6}	80	
1.1	5	6	14.7{ 1.5}	WMH13—15	
1.2	8	8	23.5{ 2.4}	20	
1.2	10	10	29.4{ 3.0}	25●	
1.4	13.5	12	35.3{ 3.6}	30	
1.4	15	14	41.2{ 4.2}	35	
1.4	18	16	47.1{ 4.8}	40●	
1.4	21	18	53.0{ 5.4}	45●	
1.6	26	20	58.8{ 6.0}	50	
1.6	27	22	64.7{ 6.6}	55	
1.6	30	24	70.6{ 7.2}	60●	
1.6	30	26	76.5{ 7.8}	65●	
1.6	35	28	82.4{ 8.4}	70●	
1.6	38	32	94.1{ 9.6}	80●	
1.8	48	36	105.9{10.8}	90	
1.2	5.5	6	17.7{ 1.8}	WMH16—15	Quotation
1.4	9	8	23.5{ 2.4}	20	
1.4	11	10	29.4{ 3.0}	25●	
1.6	15	12	35.3{ 3.6}	30	
1.6	18	14	41.2{ 4.2}	35●	
1.6	21	16	47.1{ 4.8}	40●	
1.8	24	18	53.0{ 5.4}	45	
1.8	24	20	58.8{ 6.0}	50	
1.8	25	22	64.7{ 6.6}	55	
1.8	30	24	70.6{ 7.2}	60●	
1.8	27	26	76.5{ 7.8}	65●	
1.8	35	28	82.4{ 8.4}	70●	
2.0	42	32	94.1{ 9.6}	80	
2.0	48	36	105.9{10.8}	90	
1.6	8	8	39.2{ 4.0}	WMH18—20	
1.8	13	10	49.0{ 5.0}	25	
1.8	16	12	58.8{ 6.0}	30●	
2.0	19	14	68.6{ 7.0}	35	
2.0	21	16	78.5{ 8.0}	40●	
2.1	24	18	88.3{ 9.0}	45	
2.1	26	20	98.0{10.0}	50●	
2.1	28	22	107.9{11.0}	55●	
2.1	30	24	117.7{12.0}	60●	
2.3	35	26	127.5{13.0}	65	
2.3	36	28	137.3{14.0}	70	
2.3	42	32	156.9{16.0}	80●	
2.3	51	36	176.5{18.0}	90●	
2.5	56	40	196.1{20.0}	100●	

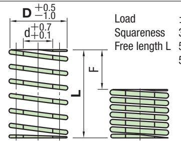
■WHH:Fmax.(allowable deflection)=L×35%

Fmax.(Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

d	Solid Height	F max.	N{kgf} max.	Part Number Type D — L	U/Price 1~19
0.45	2.3	1.7	5.0{ 0.5}	WHH4— 5*	Quotation
0.5	4.5	3.5	10.3{ 1.1}	10*	
0.6	9	5.2	15.3{ 1.6}	15	
0.65	12	7	20.6{ 2.1}	20	
0.65	14.5	8.7	25.6{ 2.6}	25	
0.7	18	10.5	30.9{ 3.2}	30	
0.5	2.5	1.7	5.0{ 0.5}	WHH5— 5*	
0.65	6	3.5	10.3{ 1.1}	10*	
0.7	9	5.2	15.3{ 1.6}	15	
0.7	10.5	7	20.6{ 2.1}	20	
0.8	14.8	8.7	25.6{ 2.6}	25	
0.8	16.8	10.5	30.9{ 3.2}	30	
0.8	19.2	12.2	35.9{ 3.7}	35	
0.8	21	14	41.2{ 4.2}	40	
0.6	2.4	1.8	10.8{ 1.1}	WHH6— 5*	
0.8	5.5	3.5	20.6{ 2.1}	10	
0.9	9	5.3	31.4{ 3.2}	15	
0.9	12	7	41.2{ 4.2}	20●	
1.0	15	8.8	52.0{ 5.3}	25	
1.0	17.5	10.5	61.8{ 6.3}	30●	
1.0	19.5	12.3	72.6{ 7.4}	35●	
1.0	23.5	14	82.4{ 8.4}	40●	
1.1	25	15.8	93.2{ 9.5}	45	
1.1	29	17.5	103.0{10.5}	50●	
1.1	31	19.2	113.0{11.5}	55●	
1.1	36	21	123.6{12.6}	60●	
1.2	39	22.7	133.6{13.6}	65	
1.2	40	24.5	144.2{14.7}	70	
0.9	5	3.5	20.6{ 2.1}	WHH 8—10	Quotation
1.0	7.5	5.3	31.4{ 3.2}	15	
1.1	10	7	41.2{ 4.2}	20	
1.1	13	8.8	52.0{ 5.3}	25●	
1.2	15	10.5	61.8{ 6.3}	30	
1.2	18	12.3	72.6{ 7.4}	35●	
1.2	22	14	82.4{ 8.4}	40●	
1.2	25	15.8	93.2{ 9.5}	45●	
1.4	30	17.5	103.0{10.5}	50	
1.4	31	19.2	113.0{11.5}	55	
1.4	35	21	123.6{12.6}	60●	
1.4	37	22.7	133.6{13.6}	65●	
1.4	40	24.5	144.2{14.7}	70●	
1.5	47	28	164.8{16.8}	80	
1.0	5	3.5	20.6{ 2.1}	WHH10—10	
1.1	8.5	5.3	31.4{ 3.2}	15●	
1.2	10.5	7	41.2{ 4.2}	20●	
1.2	14	8.8	52.0{ 5.3}	25●	
1.4	16	10.5	61.8{ 6.3}	30	
1.4	19	12.3	72.6{ 7.4}	35●	
1.4	22	14	82.4{ 8.4}	40●	
1.4	26	15.8	93.2{ 9.5}	45●	
1.6	30	17.5	103.0{10.5}	50	
1.6	30	19.2	113.0{11.5}	55	
1.6	35	21	123.6{12.6}	60●	
1.6	34	22.7	133.6{13.6}	65●	
1.6	41	24.5	144.2{14.7}	70●	
1.8	47	28	164.8{16.8}	80	
1.4	8.5	5.3	52.0{ 5.3}	WHH13—15	
1.6	10	7	68.6{ 7.0}	20	
1.6	14.5	8.8	86.3{ 8.8}	25●	
1.8	16.5	10.5	103.0{10.5}	30	
1.8	20	12.3	120.6{12.3}	35●	
1.8	24	14	137.3{14.0}	40●	
2.0	26	15.8	154.9{15.8}	45	
2.0	28	17.5	171.6{17.5}	50	
2.0	28	19.2	188.3{19.2}	55	
2.0	34	21	205.9{21.0}	60●	
2.1	36	22.7	222.6{22.7}	65	
2.1	42	24.5	240.3{24.5}	70●	
2.1	47	28	274.6{28.0}	80●	
2.3	55	31.5	308.9{31.5}	90	
1.6	6	5.3	52.0{ 5.3}	WHH16—15	Quotation
1.8	10	7	68.6{ 7.0}	20	
2.0	14.5	8.8	86.3{ 8.8}	25	
2.0	16.5	10.5	103.0{10.5}	30●	
2.1	18.5	12.3	120.6{12.3}	35	
2.1	24	14	137.3{14.0}	40●	
2.1	27	15.8	154.9{15.8}	45●	
2.3	28	17.5	171.6{17.5}	50	
2.3	30	19.2	188.3{19.2}	55	
2.3	34	21	205.9{21.0}	60	
2.3	33	22.7	222.6{22.7}	65	
2.5	42	24.5	240.3{24.5}	70	
2.5	44	28	274.6{28.0}	80	
2.6	54	31.5	308.9{31.5}	90	
2.1	11	7	103.0{10.5}	WHH18—20	
2.1	15	8.8	128.5{13.1}	25●	
2.3	17.5	10.5	154.9{15.8}	30	
2.3	20	12.5	184.4{18.8}	35	
2.5	22	14	205.9{21.0}	40	
2.5	27	15.8	231.4{23.6}	45●	
2.6	29	17.5	257.9{26.3}	50	
2.6	29	19.2	282.4{28.8}	55	
2.6	36	21	353.0{36.0}	60●	
2.9	38	22.7	334.4{34.1}	65	
2.9	43	24.5	360.9{36.8}	70	
2.9	49	28	411.9{42.0}	80●	
3.0	55	31.5	463.9{47.3}	90	
3.0	63	35	514.8{52.5}	100●	

COIL SPRINGS

—ULTRA HIGH DEFLECTION SWY—



Load ±10%
Squareness 3° or less
Free length L 50 or less±0.5mm
55 or more±1.5%

RoHS

Coil direction Right: Sectional drawing

For information on the D dimension and the counterbore hole, and also the d dimension and the shaft, ☞ P.1221

F(Allowable deflection) is due to the measurement at normal temperature (40℃).Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

D	d	L	Spring constant N/mm{kgf/mm}	F=L×65%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
11	7	20	2.26 {0.23}	13.0	29.4 {3.0}	SWY11− 20	
		25	1.81 {0.18}	16.3		25	
		30	1.51 {0.15}	19.5		30	
		35	1.29 {0.13}	22.8		35	
		40	1.13 {0.12}	26.0		40	
		45	1.01 {0.10}	29.3		45	
		50	0.91 {0.092}	32.5		50	
		55	0.82 {0.084}	35.8		55	
		60	0.75 {0.077}	39.0		60	
		65	0.70 {0.071}	42.3		65	
		70	0.65 {0.066}	45.5		70	
		75	0.60 {0.061}	48.8		75	
		80	0.57 {0.058}	52.0		80	
		90	0.50 {0.051}	58.5		90	
		100	0.45 {0.046}	65.0		100	
12.5	8.5	20	3.09 {0.32}	13.0	40.2 {4.1}	SWY12.5− 20	
		25	2.47 {0.25}	16.3		25	
		30	2.06 {0.21}	19.5		30	
		35	1.77 {0.18}	22.8		35	
		40	1.55 {0.16}	26.0		40	
		45	1.37 {0.14}	29.3		45	
		50	1.24 {0.13}	32.5		50	
		55	1.12 {0.11}	35.8		55	
		60	1.03 {0.11}	39.0		60	
		65	0.95 {0.10}	42.3		65	Quotation
		70	0.88 {0.090}	45.5		70	
		75	0.82 {0.084}	48.8		75	
		80	0.77 {0.079}	52.0		80	
		90	0.69 {0.070}	58.5		90	
		100	0.62 {0.063}	65.0		100	
		110	0.56 {0.057}	71.5		110	
		120	0.52 {0.053}	78.0		120	
		125	0.49 {0.050}	81.3		125	
16.5	10.5	20	7.02 {0.72}	13.0	91.2 {9.3}	SWY16.5− 20	
		25	5.61 {0.57}	16.3		25	
		30	4.68 {0.48}	19.5		30	
		35	4.01 {0.41}	22.8		35	
		40	3.51 {0.36}	26.0		40	
		45	3.12 {0.32}	29.3		45	
		50	2.81 {0.29}	32.5		50	
		55	2.55 {0.26}	35.8		55	
		60	2.34 {0.24}	39.0		60	
		65	2.16 {0.22}	42.3		65	
		70	2.00 {0.20}	45.5		70	
		75	1.87 {0.19}	48.8		75	
		80	1.75 {0.18}	52.0		80	
		90	1.56 {0.16}	58.5		90	
		100	1.40 {0.14}	65.0		100	
		110	1.28 {0.13}	71.5		110	
		120	1.17 {0.12}	78.0		120	
		125	1.12 {0.11}	81.3		125	
		150	0.94 {0.10}	97.5		150	
20.5	13.5	30	5.58 {0.57}	19.5	108.9 {11.1}	SWY20.5− 30	
		35	4.78 {0.49}	22.8		35	
		40	4.19 {0.43}	26.0		40	
		45	3.72 {0.38}	29.3		45	
		50	3.35 {0.34}	32.5		50	
		55	3.04 {0.31}	35.8		55	
		60	2.79 {0.28}	39.0		60	
		65	2.58 {0.26}	42.3		65	
		70	2.39 {0.24}	45.5		70	
		75	2.23 {0.23}	48.8		75	
		80	2.09 {0.21}	52.0		80	
		90	1.86 {0.19}	58.5		90	
		100	1.67 {0.17}	65.0		100	
		110	1.52 {0.16}	71.5		110	
		120	1.40 {0.14}	78.0		120	
		125	1.34 {0.14}	81.3		125	
		130	1.29 {0.13}	84.5		130	
		140	1.20 {0.12}	91.0		140	
		150	1.12 {0.11}	97.5		150	
24.5	16.5	30	6.99 {0.71}	19.5	136.3 {13.9}	SWY24.5− 30	
		35	5.99 {0.61}	22.8		35	
		40	5.24 {0.53}	26.0		40	
		45	4.66 {0.48}	29.3		45	
		50	4.19 {0.43}	32.5		50	
		55	3.81 {0.39}	35.8		55	
		60	3.50 {0.36}	39.0		60	
		65	3.23 {0.33}	42.3		65	
		70	3.00 {0.31}	45.5		70	
		75	2.80 {0.29}	48.8		75	
		80	2.62 {0.27}	52.0		80	
		90	2.33 {0.24}	58.5		90	
		100	2.10 {0.21}	65.0		100	Quotation
		110	1.91 {0.19}	71.5		110	
		120	1.75 {0.18}	78.0		120	
		125	1.68 {0.17}	81.3		125	
		130	1.61 {0.16}	84.5		130	
		140	1.50 {0.15}	91.0		140	
		150	1.40 {0.14}	97.5		150	
		175	1.20 {0.12}	113.8		175	
		200	1.05 {0.11}	130.0		200	
30	21	35	8.79 {0.90}	22.8	200.1 {20.4}	SWY30− 35	
		40	7.69 {0.78}	26.0		40	
		45	6.84 {0.70}	29.3		45	
		50	6.16 {0.63}	32.5		50	
		55	5.60 {0.57}	35.8		55	
		60	5.13 {0.52}	39.0		60	
		65	4.74 {0.48}	42.3		65	
		70	4.40 {0.45}	45.5		70	
		75	4.10 {0.42}	48.8		75	
		80	3.85 {0.39}	52.0		80	
		90	3.42 {0.35}	58.5		90	
		100	3.08 {0.31}	65.0		100	
		110	2.80 {0.29}	71.5		110	
		120	2.56 {0.26}	78.0		120	
		125	2.46 {0.25}	81.3		125	
		130	2.37 {0.24}	84.5		130	
		140	2.20 {0.22}	91.0		140	
		150	2.05 {0.21}	97.5		150	
		160	1.92 {0.20}	104.0		160	
		170	1.81 {0.18}	110.5		170	
		175	1.76 {0.18}	113.8		175	
		180	1.71 {0.17}	117.0		180	
		190	1.62 {0.17}	123.5		190	
		200	1.54 {0.16}	130.0		200	
		250	1.23 {0.13}	162.5		250	
		300	1.03 {0.10}	195.0		300	
37	26	40	11.32 {1.15}	26.0	294.2 {30.0}	SWY37− 40	
		45	10.06 {1.03}	29.3		45	
		50	9.05 {0.92}	32.5		50	
		55	8.23 {0.84}	35.8		55	
		60	7.54 {0.77}	39.0		60	
		65	6.96 {0.71}	42.3		65	
		70	6.47 {0.66}	45.5		70	
		75	6.03 {0.62}	48.8		75	
		80	5.66 {0.58}	52.0		80	
		90	5.03 {0.51}	58.5		90	
		100	4.53 {0.46}	65.0		100	
		110	4.11 {0.42}	71.5		110	
		120	3.77 {0.38}	78.0		120	
		130	3.48 {0.36}	84.5		130	
		140	3.23 {0.33}	91.0		140	
		150	3.02 {0.31}	97.5		150	
		160	2.83 {0.29}	104.0		160	
		170	2.66 {0.27}	110.5		170	
		180	2.51 {0.26}	117.0		180	
		190	2.38 {0.24}	123.5		190	
		200	2.26 {0.23}	130.0		200	Quotation
		225	2.01 {0.21}	146.3		225	
		250	1.81 {0.18}	162.5		250	
		275	1.65 {0.17}	178.8		275	
		300	1.51 {0.15}	195.0		300	
42	31	50	12.07 {1.23}	32.5	392.3 {40.0}	SWY42− 50	
		60	10.06 {1.03}	39.0		60	
		70	8.62 {0.88}	45.5		70	
		80	7.54 {0.77}	52.0		80	
		90	6.71 {0.68}	58.5		90	
		100	6.03 {0.62}	65.0		100	
		110	5.49 {0.56}	71.5		110	
		120	5.03 {0.51}	78.0		120	
		130	4.64 {0.47}	84.5		130	
		140	4.31 {0.44}	91.0		140	
		150	4.02 {0.41}	97.5		150	
		160	3.77 {0.38}	104.0		160	
		170	3.55 {0.36}	110.5		170	
		180	3.35 {0.34}	117.0		180	
		190	3.18 {0.32}	123.5		190	
		200	3.02 {0.31}	130.0		200	
		225	2.68 {0.27}	146.3		225	
		250	2.41 {0.25}	162.5		250	
		275	2.19 {0.22}	178.8		275	
		300	2.01 {0.21}	195.0		300	

Order	Part Number SWY 12.5—40 SWU 17 —40
Days to Ship	Quotation
Price	Quotation

Ⓜ Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load＝Spring constant×Deflection
(International unit) N＝N/mm×Fmm
kgf＝kgf/mm×Fmm
(kgf＝N×0.101972)

Times used: 1 million (300 thousand times for L×70%)

Product guide ☞ P.1219 Load deflection diagram ☞ P.1258

Instructions and notes for coil springs ☞ P.1221

Alterations

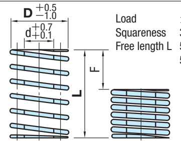
(NT) — Part Number
NT — SWY 30—40

Quotation

Alteration	**Paint peeling** No painting
Code	NT
Spec.	Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.
Price	Details ☞ P.1257

COIL SPRINGS

—SUPER HIGH DEFLECTION SWU—



Load ±10%
Squareness 3° or less
Free length L 50 or less±0.5mm
55 or more±1.5%

RoHS

Coil direction Right: Sectional drawing

For information on the D dimension and the counterbore hole, and also the d dimension and the shaft, ☞ P.1221

F(Allowable deflection) is due to the measurement at normal temperature (40℃).Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

D	d	L	Spring constant N/mm{kgf/mm}	F=L×60%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
10.5	6.0	15	7.63 {0.78}	9.0	68.6 {7.0}	SWU10.5− 15	
		20	5.72 {0.58}	12.0		20	
		25	4.58 {0.47}	15.0		25	
		30	3.81 {0.39}	18.0		30	
		35	3.27 {0.33}	21.0		35	
		40	2.86 {0.29}	24.0		40	
		45	2.54 {0.26}	27.0		45	
		50	2.29 {0.23}	30.0		50	
		55	2.08 {0.21}	33.0		55	
		60	1.91 {0.19}	36.0		60	
		65	1.76 {0.18}	39.0		65	
		70	1.63 {0.17}	42.0		70	
		75	1.53 {0.16}	45.0		75	
		80	1.43 {0.15}	48.0		80	
12.5	7.0	15	8.72 {0.89}	9.0	78.5 {8.0}	SWU12.5− 15	
		20	6.54 {0.67}	12.0		20	
		25	5.23 {0.53}	15.0		25	
		30	4.36 {0.44}	18.0		30	
		35	3.74 {0.38}	21.0		35	
		40	3.27 {0.33}	24.0		40	
		45	2.91 {0.30}	27.0		45	
		50	2.62 {0.27}	30.0		50	
		55	2.38 {0.24}	33.0		55	
		60	2.18 {0.22}	36.0		60	
		65	2.01 {0.21}	39.0		65	
		70	1.87 {0.19}	42.0		70	
		75	1.74 {0.18}	45.0		75	
		80	1.63 {0.17}	48.0		80	
		90	1.45 {0.15}	54.0		90	
		100	1.31 {0.13}	60.0		100	
14.5	8.5	15	10.90 {1.11}	9.0	98.1 {10.0}	SWU14.5− 15	
		20	8.17 {0.83}	12.0		20	
		25	6.54 {0.67}	15.0		25	Quotation
		30	5.45 {0.56}	18.0		30	
		35	4.67 {0.48}	21.0		35	
		40	4.09 {0.42}	24.0		40	
		45	3.63 {0.37}	27.0		45	
		50	3.27 {0.33}	30.0		50	
		55	2.97 {0.30}	33.0		55	
		60	2.72 {0.28}	36.0		60	
		65	2.51 {0.26}	39.0		65	
		70	2.33 {0.24}	42.0		70	
		75	2.18 {0.22}	45.0		75	
		80	2.04 {0.21}	48.0		80	
		90	1.82 {0.19}	54.0		90	
		100	1.63 {0.17}	60.0		100	
		110	1.49 {0.15}	66.0		110	
		120	1.36 {0.14}	72.0		120	
		125	1.31 {0.13}	75.0		125	
		150	1.09 {0.11}	90.0		150	
17	10.5	20	12.26 {1.25}	12.0	147.1 {15.0}	SWU17− 20	
		25	9.81 {1.00}	15.0		25	
		30	8.17 {0.83}	18.0		30	
		35	7.00 {0.71}	21.0		35	
		40	6.13 {0.63}	24.0		40	
		45	5.45 {0.56}	27.0		45	
		50	4.90 {0.50}	30.0		50	
		55	4.46 {0.45}	33.0		55	
		60	4.09 {0.42}	36.0		60	
		65	3.77 {0.38}	39.0		65	
		70	3.50 {0.36}	42.0		70	
		75	3.27 {0.33}	45.0		75	
		80	3.06 {0.31}	48.0		80	
		90	2.72 {0.28}	54.0		90	
		100	2.45 {0.25}	60.0		100	
		110	2.23 {0.23}	66.0		110	
		120	2.04 {0.21}	72.0		120	
		125	1.96 {0.20}	75.0		125	
		150	1.63 {0.17}	90.0		150	
		175	1.40 {0.14}	105.0		175	
21	13.5	25	15.04 {1.53}	15.0	225.6 {23.0}	SWU21− 25	
		30	12.53 {1.28}	18.0		30	
		35	10.74 {1.10}	21.0		35	
		40	9.40 {0.96}	24.0		40	
		45	8.35 {0.85}	27.0		45	
		50	7.52 {0.77}	30.0		50	
		55	6.83 {0.70}	33.0		55	
		60	6.27 {0.64}	36.0		60	
		65	5.78 {0.59}	39.0		65	
		70	5.37 {0.55}	42.0		70	
		75	5.01 {0.51}	45.0		75	
		80	4.70 {0.48}	48.0		80	
		90	4.18 {0.43}	54.0		90	
		100	3.76 {0.38}	60.0		100	
		110	3.42 {0.35}	66.0		110	
		120	3.13 {0.32}	72.0		120	
		125	3.01 {0.31}	75.0		125	
		130	2.89 {0.29}	78.0		130	
		140	2.69 {0.27}	84.0		140	
		150	2.51 {0.26}	90.0		150	
		175	2.15 {0.22}	105.0		175	
		200	1.88 {0.19}	120.0		200	
26	16.5	30	16.34 {1.67}	18.0	294.2 {30.0}	SWU26− 30	
		35	14.01 {1.43}	21.0		35	
		40	12.26 {1.25}	24.0		40	
		45	10.90 {1.11}	27.0		45	
		50	9.81 {1.00}	30.0		50	
		55	8.92 {0.91}	33.0		55	
		60	8.17 {0.83}	36.0		60	
		65	7.54 {0.77}	39.0		65	
		70	7.00 {0.71}	42.0		70	
		75	6.54 {0.67}	45.0		75	
		80	6.13 {0.63}	48.0		80	
		90	5.45 {0.56}	54.0		90	Quotation
		100	4.90 {0.50}	60.0		100	
		110	4.46 {0.45}	66.0		110	
		120	4.09 {0.42}	72.0		120	
		125	3.92 {0.40}	75.0		125	
		130	3.77 {0.38}	78.0		130	
		140	3.50 {0.36}	84.0		140	
		150	3.27 {0.33}	90.0		150	
		175	2.80 {0.29}	105.0		175	
		200	2.45 {0.25}	120.0		200	
		225	2.18 {0.22}	135.0		225	
		250	1.96 {0.20}	150.0		250	
31	21	35	17.75 {1.81}	21.0	372.7 {38.0}	SWU31− 35	
		40	15.53 {1.58}	24.0		40	
		45	13.80 {1.41}	27.0		45	
		50	12.42 {1.27}	30.0		50	
		55	11.29 {1.15}	33.0		55	
		60	10.35 {1.06}	36.0		60	
		65	9.56 {0.97}	39.0		65	
		70	8.87 {0.90}	42.0		70	
		75	8.28 {0.84}	45.0		75	
		80	7.76 {0.79}	48.0		80	
		90	6.90 {0.70}	54.0		90	
		100	6.21 {0.63}	60.0		100	
		110	5.65 {0.58}	66.0		110	
		120	5.18 {0.53}	72.0		120	
		125	4.97 {0.51}	75.0		125	
		130	4.78 {0.49}	78.0		130	
		140	4.44 {0.45}	84.0		140	
		150	4.14 {0.42}	90.0		150	
		160	3.88 {0.40}	96.0		160	
		170	3.65 {0.37}	102.0		170	
		175	3.55 {0.36}	105.0		175	
		180	3.45 {0.35}	108.0		180	
		190	3.27 {0.33}	114.0		190	
		200	3.11 {0.32}	120.0		200	
		250	2.48 {0.25}	150.0		250	
		300	2.07 {0.21}	180.0		300	
37	26	40	19.20 {1.96}	24.0	460.9 {47.0}	SWU37− 40	
		45	17.07 {1.74}	27.0		45	
		50	15.36 {1.57}	30.0		50	
		55	13.97 {1.42}	33.0		55	
		60	12.80 {1.31}	36.0		60	
		65	11.82 {1.21}	39.0		65	
		70	10.97 {1.12}	42.0		70	
		75	10.24 {1.04}	45.0		75	
		80	9.60 {0.98}	48.0		80	
		90	8.54 {0.87}	54.0		90	
		100	7.68 {0.78}	60.0		100	
		110	6.98 {0.71}	66.0		110	
		120	6.40 {0.65}	72.0		120	
		130	5.91 {0.60}	78.0		130	
		140	5.49 {0.56}	84.0		140	
		150	5.12 {0.52}	90.0		150	
		160	4.80 {0.49}	96.0		160	
		170	4.52 {0.46}	102.0		170	
		180	4.27 {0.44}	108.0		180	
		190	4.04 {0.41}	114.0		190	
		200	3.84 {0.39}	120.0		200	Quotation
		225	3.41 {0.35}	135.0		225	
		250	3.07 {0.31}	150.0		250	
		275	2.79 {0.28}	165.0		275	
		300	2.56 {0.26}	180.0		300	
43	31	50	19.61 {2.00}	30.0	588.4 {60.0}	SWU43− 50	
		60	16.34 {1.67}	36.0		60	
		70	14.01 {1.43}	42.0		70	
		80	12.26 {1.25}	48.0		80	
		90	10.90 {1.11}	54.0		90	
		100	9.81 {1.00}	60.0		100	
		110	8.92 {0.91}	66.0		110	
		120	8.17 {0.83}	72.0		120	
		130	7.54 {0.77}	78.0		130	
		140	7.00 {0.71}	84.0		140	
		150	6.54 {0.67}	90.0		150	
		160	6.13 {0.63}	96.0		160	
		170	5.77 {0.59}	102.0		170	
		180	5.45 {0.56}	108.0		180	
		190	5.16 {0.53}	114.0		190	
		200	4.90 {0.50}	120.0		200	
		225	4.36 {0.44}	135.0		225	
		250	3.92 {0.40}	150.0		250	
		275	3.57 {0.36}	165.0		275	
		300	3.27 {0.33}	180.0		300	

■Order · Lead time · Quantity dsicount rate ☞ Left page

Ⓜ Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load＝Spring constant×Deflection
(International unit) N＝N/mm×Fmm
kgf＝kgf/mm×Fmm
(kgf＝N×0.101972)

Times used: 1 million (300 thousand times for L×65%)

Product guide ☞ P.1219 Load deflection diagram ☞ P.1258

Instructions and notes for coil springs ☞ P.1221

Alterations

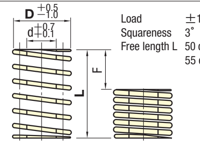
(NT) — Part Number
NT — SWU 31—50

Quotation

Alteration	**Paint peeling** No painting
Code	NT
Spec.	Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.
Details	☞ P.1257

COIL SPRINGS

—HIGH DEFLECTION SWR—



Load ±10%
Squareness 3° or less
Free length L 50 or less±0.5mm
55 or more±1.5%

RoHS

Coil direction Right: Sectional drawing

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

F (Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

D	d	L	Spring constant N/mm{kgf/mm}	F=L×50%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D—L	1～19
10.5	6.0	15	10.46 {1.07}	7.5	78.5 {8.0}	SWR 10.5— 15	
		20	7.85 {0.80}	10.0		20	
		25	6.28 {0.64}	12.5		25	
		30	5.23 {0.53}	15.0		30	
		35	4.48 {0.46}	17.5		35	
		40	3.92 {0.40}	20.0		40	
		45	3.49 {0.36}	22.5		45	
		50	3.14 {0.32}	25.0		50	
		55	2.85 {0.29}	27.5		55	
		60	2.62 {0.27}	30.0		60	
		65	2.41 {0.25}	32.5		65	
		70	2.24 {0.23}	35.0		70	
		75	2.09 {0.21}	37.5		75	
		80	1.96 {0.20}	40.0		80	
12.5	7.0	15	11.77 {1.20}	7.5	88.3 {9.0}	SWR 12.5— 15	
		20	8.83 {0.90}	10.0		20	
		25	7.06 {0.72}	12.5		25	
		30	5.88 {0.60}	15.0		30	
		35	5.04 {0.51}	17.5		35	
		40	4.41 {0.45}	20.0		40	
		45	3.92 {0.40}	22.5		45	Quotation
		50	3.53 {0.36}	25.0		50	
		55	3.21 {0.33}	27.5		55	
		60	2.94 {0.30}	30.0		60	
		65	2.72 {0.28}	32.5		65	
		70	2.52 {0.26}	35.0		70	
		75	2.35 {0.24}	37.5		75	
		80	2.21 {0.23}	40.0		80	
		90	1.96 {0.20}	45.0		90	
		100	1.77 {0.18}	50.0		100	
14.5	8.5	15	17.00 {1.73}	7.5	127.5 {13.0}	SWR 14.5— 15	
		20	12.75 {1.30}	10.0		20	
		25	10.20 {1.04}	12.5		25	
		30	8.50 {0.87}	15.0		30	
		35	7.28 {0.74}	17.5		35	
		40	6.37 {0.65}	20.0		40	
		45	5.67 {0.58}	22.5		45	
		50	5.10 {0.52}	25.0		50	
		55	4.64 {0.47}	27.5		55	
		60	4.25 {0.43}	30.0		60	
		65	3.92 {0.40}	32.5		65	
		70	3.64 {0.37}	35.0		70	
		75	3.40 {0.35}	37.5		75	
		80	3.19 {0.33}	40.0		80	
		90	2.83 {0.29}	45.0		90	
		100	2.55 {0.26}	50.0		100	
		125	2.04 {0.21}	62.5		125	
		150	1.70 {0.17}	75.0		150	
17	10.5	20	19.61 {2.00}	10.0	196.1 {20.0}	SWR 17— 20	
		25	15.69 {1.60}	12.5		25	
		30	13.08 {1.33}	15.0		30	
		35	11.21 {1.14}	17.5		35	
		40	9.81 {1.00}	20.0		40	
		45	8.72 {0.89}	22.5		45	
		50	7.85 {0.80}	25.0		50	
		55	7.13 {0.73}	27.5		55	
		60	6.54 {0.67}	30.0		60	
		65	6.03 {0.62}	32.5		65	
		70	5.60 {0.57}	35.0		70	
		75	5.23 {0.53}	37.5		75	
		80	4.90 {0.50}	40.0		80	
		90	4.36 {0.44}	45.0		90	
		100	3.92 {0.40}	50.0		100	
		125	3.14 {0.32}	62.5		125	
		150	2.62 {0.27}	75.0		150	
		175	2.24 {0.23}	87.5		175	
21	13.5	25	23.54 {2.40}	12.5	294.2 {30.0}	SWR 21— 25	
		30	19.61 {2.00}	15.0		30	
		35	16.81 {1.71}	17.5		35	
		40	14.71 {1.50}	20.0		40	
		45	13.08 {1.33}	22.5		45	
		50	11.77 {1.20}	25.0		50	
		55	10.70 {1.09}	27.5		55	
		60	9.81 {1.00}	30.0		60	
		65	9.05 {0.92}	32.5		65	
		70	8.41 {0.86}	35.0		70	
		75	7.85 {0.80}	37.5		75	Quotation
		80	7.35 {0.75}	40.0		80	
		90	6.54 {0.67}	45.0		90	
		100	5.88 {0.60}	50.0		100	
		110	5.35 {0.55}	55.0		110	
		120	4.90 {0.50}	60.0		120	
		125	4.71 {0.48}	62.5		125	
		130	4.53 {0.46}	65.0		130	
		140	4.20 {0.43}	70.0		140	
		150	3.92 {0.40}	75.0		150	
		175	3.36 {0.34}	87.5		175	
		200	2.94 {0.30}	100.0		200	
26	16.5	25	31.38 {3.20}	12.5	392.3 {40.0}	SWR 26— 25	
		30	26.15 {2.67}	15.0		30	
		35	22.42 {2.29}	17.5		35	
		40	19.61 {2.00}	20.0		40	
		45	17.43 {1.78}	22.5		45	
		50	15.69 {1.60}	25.0		50	
		55	14.26 {1.45}	27.5		55	
		60	13.08 {1.33}	30.0		60	
		65	12.07 {1.23}	32.5		65	
		70	11.21 {1.14}	35.0		70	
		75	10.46 {1.07}	37.5		75	
		80	9.81 {1.00}	40.0		80	
		90	8.72 {0.89}	45.0		90	
		100	7.85 {0.80}	50.0		100	
		110	7.13 {0.73}	55.0		110	
		120	6.54 {0.67}	60.0		120	
		125	6.28 {0.64}	62.5		125	
		130	6.03 {0.62}	65.0		130	
		140	5.60 {0.57}	70.0		140	
		150	5.23 {0.53}	75.0		150	
		175	4.48 {0.46}	87.5		175	
		200	3.92 {0.40}	100.0		200	
		225	3.49 {0.36}	112.5		225	
		250	3.14 {0.32}	125.0		250	
31	21	35	28.02 {2.86}	17.5	490.3 {50.0}	SWR 31— 35	
		40	24.52 {2.50}	20.0		40	
		45	21.79 {2.22}	22.5		45	
		50	19.61 {2.00}	25.0		50	
		55	17.83 {1.82}	27.5		55	
		60	16.34 {1.67}	30.0		60	
		65	15.09 {1.54}	32.5		65	
		70	14.01 {1.43}	35.0		70	
		75	13.08 {1.33}	37.5		75	
		80	12.26 {1.25}	40.0		80	
		90	10.90 {1.11}	45.0		90	
		100	9.81 {1.00}	50.0		100	
		110	8.92 {0.91}	55.0		110	
		120	8.17 {0.83}	60.0		120	
		125	7.85 {0.80}	62.5		125	
		130	7.54 {0.77}	65.0		130	
		140	7.00 {0.71}	70.0		140	
		150	6.54 {0.67}	75.0		150	
		160	6.13 {0.63}	80.0		160	
		170	5.77 {0.59}	85.0		170	
		175	5.60 {0.57}	87.5		175	
		180	5.45 {0.56}	90.0		180	
		190	5.16 {0.53}	95.0		190	Quotation
		200	4.90 {0.50}	100.0		200	
		250	3.92 {0.40}	125.0		250	
		300	3.27 {0.33}	150.0		300	
37	26	35	33.62 {3.43}	17.5	588.4 {60.0}	SWR 37— 35	
		40	29.42 {3.00}	20.0		40	
		45	26.15 {2.67}	22.5		45	
		50	23.54 {2.40}	25.0		50	
		55	21.40 {2.18}	27.5		55	
		60	19.61 {2.00}	30.0		60	
		65	18.10 {1.85}	32.5		65	
		70	16.81 {1.71}	35.0		70	
		75	15.69 {1.60}	37.5		75	
		80	14.71 {1.50}	40.0		80	
		90	13.08 {1.33}	45.0		90	
		100	11.77 {1.20}	50.0		100	
		110	10.70 {1.09}	55.0		110	
		120	9.81 {1.00}	60.0		120	
		125	9.41 {0.96}	62.5		125	
		130	9.05 {0.92}	65.0		130	
		140	8.41 {0.86}	70.0		140	
		150	7.85 {0.80}	75.0		150	
		160	7.35 {0.75}	80.0		160	
		170	6.92 {0.71}	85.0		170	
		175	6.72 {0.69}	87.5		175	
		180	6.54 {0.67}	90.0		180	
		190	6.19 {0.63}	95.0		190	
		200	5.88 {0.60}	100.0		200	
		250	4.71 {0.48}	125.0		250	
		300	3.92 {0.40}	150.0		300	
43	31	50	33.34 {3.40}	25.0	833.6 {85.0}	SWR 43— 50	
		60	27.79 {2.83}	30.0		60	
		70	23.82 {2.43}	35.0		70	
		80	20.84 {2.13}	40.0		80	
		90	18.52 {1.89}	45.0		90	
		100	16.67 {1.70}	50.0		100	
		110	15.16 {1.55}	55.0		110	
		120	13.89 {1.42}	60.0		120	
		130	12.82 {1.31}	65.0		130	
		140	11.91 {1.21}	70.0		140	
		150	11.11 {1.13}	75.0		150	
		160	10.42 {1.06}	80.0		160	
		170	9.81 {1.00}	85.0		170	
		180	9.26 {0.94}	90.0		180	
		190	8.77 {0.89}	95.0		190	
		200	8.34 {0.85}	100.0		200	
		225	7.41 {0.76}	112.5		225	
		250	6.67 {0.68}	125.0		250	
		275	6.06 {0.62}	137.5		275	
		300	5.56 {0.57}	150.0		300	
46	33	50	43.15 {4.40}	25.0	1079 {110}	SWR 46— 50	
		60	35.96 {3.67}	30.0		60	
		70	30.82 {3.14}	35.0		70	
		80	26.97 {2.75}	40.0		80	
		90	23.97 {2.44}	45.0		90	
		100	21.57 {2.20}	50.0		100	Quotation
		110	19.61 {2.00}	55.0		110	
		120	17.98 {1.83}	60.0		120	
		125	17.26 {1.76}	62.5		125	
		130	16.60 {1.69 }	65.0		130	
		140	15.41 {1.57}	70.0		140	
		150	14.38 {1.47}	75.0		150	
		175	12.33 {1.26}	87.5		175	
		200	10.79 {1.10}	100.0		200	
		225	9.59 {0.98}	112.5		225	
		250	8.63 {0.88}	125.0		250	
		275	7.85 {0.80}	137.5		275	
		300	7.19 {0.73}	150.0		300	
50	36	50	52.96 {5.40}	25.0	1324 {135}	SWR 50— 50	
		60	44.13 {4.50}	30.0		60	
		70	37.83 {3.86}	35.0		70	
		80	33.10 {3.38}	40.0		80	
		90	29.42 {3.00}	45.0		90	
		100	26.48 {2.70}	50.0		100	
		110	24.07 {2.45}	55.0		110	
		120	22.06 {2.25}	60.0		120	
		130	20.37 {2.08}	65.0		130	
		140	18.91 {1.93}	70.0		140	
		150	17.65 {1.80}	75.0		150	
		175	15.13 {1.54}	87.5		175	
		200	13.24 {1.35}	100.0		200	
		225	11.77 {1.20}	112.5		225	
		250	10.59 {1.08}	125.0		250	
		275	9.63 {0.98}	137.5		275	
		300	8.83 {0.90}	150.0		300	
		350	7.57 {0.77}	175.0		350	
		400	6.62 {0.68}	200.0		400	

M Equivalent of SWOSC—V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- Times used: 1 million (300 thousand times for L×55%)
- Product guide **P.1219**
- Instructions and notes for coil springs **P.1221**
- Load deflection diagram **P.1258**

Order Part Number
SWR37—40

Days to Ship Quotation

Price Quotation

Alterations

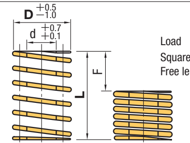
(NT) — Part Number
NT — SWR 31—60

Quotation

Alteration	Code	Spec.	Details
No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

COIL SPRINGS

—MEDIUM DEFLECTION SWS—



RoHS

Load +20% −10%
Squareness 3° or less
Free length L ±2%

Coil direction Right : Sectional drawing

For information on the D dimension and the counterbore hole, and also the d dimension and the shaft, P.1221

F (Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
10.5	5.5	20	10.90 {1.11}	8.0	87.2 {8.9}	SWS10.5− 20	
		25	8.72 {0.89}	10.0		25	
		30	7.27 {0.74}	12.0		30	
		35	6.23 {0.64}	14.0		35	
		40	5.45 {0.56}	16.0		40	
		45	4.84 {0.49}	18.0		45	
		50	4.36 {0.44}	20.0		50	
		55	3.96 {0.40}	22.0		55	
		60	3.63 {0.37}	24.0		60	
		65	3.35 {0.34}	26.0		65	
		70	3.11 {0.32}	28.0		70	
		75	2.91 {0.30}	30.0		75	
		80	2.73 {0.28}	32.0		80	
12.5	6.5	20	15.25 {1.56}	8.0	122.0 {12.4}	SWS12.5− 20	
		25	12.20 {1.24}	10.0		25	
		30	10.17 {1.04}	12.0		30	
		35	8.71 {0.89}	14.0		35	
		40	7.63 {0.78}	16.0		40	Quotation
		45	6.78 {0.69}	18.0		45	
		50	6.10 {0.62}	20.0		50	
		55	5.55 {0.57}	22.0		55	
		60	5.08 {0.52}	24.0		60	
		65	4.69 {0.48}	26.0		65	
		70	4.36 {0.44}	28.0		70	
		75	4.07 {0.41}	30.0		75	
		80	3.81 {0.39}	32.0		80	
14.5	8.5	20	24.50 {2.50}	8.0	196.0 {20.0}	SWS14.5− 20	
		25	19.61 {2.00}	10.0		25	
		30	16.33 {1.67}	12.0		30	
		35	14.00 {1.43}	14.0		35	
		40	12.25 {1.25}	16.0		40	
		45	10.89 {1.11}	18.0		45	
		50	9.80 {1.00}	20.0		50	
		55	8.91 {0.91}	22.0		55	
		60	8.17 {0.83}	24.0		60	
		65	7.54 {0.77}	26.0		65	
		70	7.00 {0.71}	28.0		70	
		75	6.53 {0.67}	30.0		75	
		80	6.13 {0.62}	32.0		80	
		90	5.44 {0.56}	36.0		90	
		100	4.90 {0.50}	40.0		100	
		125	3.92 {0.40}	50.0		125	
		150	3.27 {0.33}	60.0		150	

M Equivalent of SWOSC—V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

- Times used: 1 million (300 thousand times for L×45%)
- Product guide P.1219
- Instructions and notes for coil springs P.1221
- Load deflection diagram P.1258

Order	Part Number SWS21−100
Days to Ship	Quotation
Price	Quotation

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
17	10.5	25	29.42 {3.00}	10.0	294.2 {30.0}	SWS 17− 25	
		30	24.52 {2.50}	12.0		30	
		35	21.01 {2.14}	14.0		35	
		40	18.39 {1.88}	16.0		40	
		45	16.34 {1.67}	18.0		45	
		50	14.71 {1.50}	20.0		50	
		55	13.37 {1.36}	22.0		55	
		60	12.26 {1.25}	24.0		60	
		65	11.32 {1.15}	26.0		65	
		70	10.51 {1.07}	28.0		70	
		75	9.81 {1.00}	30.0		75	
		80	9.19 {0.94}	32.0		80	
		90	8.17 {0.83}	36.0		90	
		100	7.35 {0.75}	40.0		100	
		125	5.88 {0.60}	50.0		125	
		150	4.90 {0.50}	60.0		150	
21	13.5	30	35.17 {3.59}	12.0	422.0 {43.0}	SWS 21− 30	
		35	30.14 {3.07}	14.0		35	
		40	26.38 {2.69}	16.0		40	
		45	23.44 {2.39}	18.0		45	
		50	21.10 {2.15}	20.0		50	
		55	19.18 {1.96}	22.0		55	
		60	17.58 {1.79}	24.0		60	
		65	16.23 {1.66}	26.0		65	
		70	15.07 {1.54}	28.0		70	
		75	14.07 {1.43}	30.0		75	
		80	13.19 {1.34}	32.0		80	Quotation
		90	11.72 {1.20}	36.0		90	
		100	10.55 {1.08}	40.0		100	
		110	9.59 {0.98}	44.0		110	
		120	8.79 {0.90}	48.0		120	
		125	8.44 {0.86}	50.0		125	
		130	8.12 {0.83}	52.0		130	
		140	7.54 {0.77}	56.0		140	
		150	7.03 {0.72}	60.0		150	
		175	6.03 {0.61}	70.0		175	
		200	5.28 {0.54}	80.0		200	
26	16.5	30	47.42 {4.84}	12.0	569.0 {58.0}	SWS 26− 30	
		35	40.64 {4.14}	14.0		35	
		40	35.56 {3.63}	16.0		40	
		45	31.61 {3.22}	18.0		45	
		50	28.45 {2.90}	20.0		50	
		55	25.86 {2.64}	22.0		55	
		60	23.71 {2.42}	24.0		60	
		65	21.88 {2.23}	26.0		65	
		70	20.32 {2.07}	28.0		70	
		75	18.97 {1.93}	30.0		75	
		80	17.78 {1.81}	32.0		80	
		90	15.81 {1.61}	36.0		90	
		100	14.23 {1.45}	40.0		100	
		110	12.93 {1.32}	44.0		110	
		120	11.85 {1.21}	48.0		120	
		125	11.38 {1.16}	50.0		125	
		130	10.94 {1.12}	52.0		130	
		140	10.16 {1.04}	56.0		140	
		150	9.48 {0.97}	60.0		150	
		175	8.13 {0.83}	70.0		175	
		200	7.11 {0.73}	80.0		200	
		225	6.32 {0.64}	90.0		225	
		250	5.69 {0.58}	100.0		250	

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
31	21	40	49.00 {5.00}	16.0	784.0 {79.9}	SWS 31− 40	
		45	43.56 {4.44}	18.0		45	
		50	39.20 {4.00}	20.0		50	
		55	35.64 {3.63}	22.0		55	
		60	32.67 {3.33}	24.0		60	
		65	30.15 {3.07}	26.0		65	
		70	28.00 {2.86}	28.0		70	
		75	26.13 {2.66}	30.0		75	
		80	24.50 {2.50}	32.0		80	
		90	21.78 {2.22}	36.0		90	
		100	19.60 {2.00}	40.0		100	
		110	17.82 {1.82}	44.0		110	
		120	16.33 {1.67}	48.0		120	
		125	15.68 {1.60}	50.0		125	
		130	15.08 {1.54}	52.0		130	
		140	14.00 {1.43}	56.0		140	
		150	13.07 {1.33}	60.0		150	
		160	12.25 {1.25}	64.0		160	
		170	11.53 {1.18}	68.0		170	
		175	11.20 {1.14}	70.0		175	
		180	10.89 {1.11}	72.0		180	
		190	10.32 {1.05}	76.0		190	Quotation
		200	9.80 {1.00}	80.0		200	
		250	7.84 {0.80}	100.0		250	
		300	6.53 {0.67}	120.0		300	
37	26	40	52.13 {5.32}	16.0	834.0 {85.0}	SWS 37− 40	
		45	46.33 {4.72}	18.0		45	
		50	41.70 {4.25}	20.0		50	
		55	37.91 {3.87}	22.0		55	
		60	34.75 {3.54}	24.0		60	
		65	32.08 {3.27}	26.0		65	
		70	29.79 {3.04}	28.0		70	
		75	27.80 {2.83}	30.0		75	
		80	26.06 {2.66}	32.0		80	
		90	23.17 {2.36}	36.0		90	
		100	20.85 {2.13}	40.0		100	
		110	18.95 {1.93}	44.0		110	
		120	17.38 {1.77}	48.0		120	
		125	16.68 {1.70}	50.0		125	
		130	16.04 {1.64}	52.0		130	
		140	14.89 {1.52}	56.0		140	
		150	13.90 {1.42}	60.0		150	
		160	13.03 {1.33}	64.0		160	
		170	12.26 {1.25}	68.0		170	
		175	11.91 {1.21}	70.0		175	
		180	11.58 {1.18}	72.0		180	
		190	10.97 {1.12}	76.0		190	
		200	10.43 {1.06}	80.0		200	
		250	8.34 {0.85}	100.0		250	
		300	6.95 {0.71}	120.0		300	

Alterations

(NT) — Part Number
NT — SWS 31−70

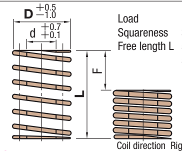
Quotation

Alteration	Code	Spec.	Details
 No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
44.5	31	50	50.15 {5.11}	20.0	1003 {102}	SWS 44.5− 50	
		60	41.79 {4.26}	24.0		60	
		70	35.82 {3.65}	28.0		70	
		80	31.34 {3.20}	32.0		80	
		90	27.86 {2.84}	36.0		90	
		100	25.08 {2.56}	40.0		100	
		110	22.80 {2.32}	44.0		110	
		120	20.90 {2.13}	48.0		120	
		130	19.29 {1.97}	52.0		130	
		140	17.91 {1.83}	56.0		140	
		150	16.72 {1.70}	60.0		150	
		160	15.67 {1.60}	64.0		160	
		170	14.75 {1.50}	68.0		170	
		180	13.93 {1.42}	72.0		180	
		190	13.20 {1.35}	76.0		190	
		200	12.54 {1.28}	80.0		200	
		225	11.14 {1.14}	90.0		225	
		250	10.03 {1.02}	100.0		250	
		275	9.12 {0.93}	110.0		275	
		300	8.36 {0.85}	120.0		300	
46	33	50	63.74 {6.50}	20.0	1275 {130}	SWS 46− 50	
		60	53.12 {5.42}	24.0		60	
		70	45.53 {4.64}	28.0		70	
		80	39.84 {4.06}	32.0		80	Quotation
		90	35.41 {3.61}	36.0		90	
		100	31.87 {3.25}	40.0		100	
		110	28.97 {2.95}	44.0		110	
		120	26.56 {2.71}	48.0		120	
		125	25.50 {2.60}	50.0		125	
		130	24.52 {2.50}	52.0		130	
		140	22.77 {2.32}	56.0		140	
		150	21.25 {2.17}	60.0		150	
		175	18.21 {1.86}	70.0		175	
		200	15.94 {1.63}	80.0		200	
		225	14.17 {1.44}	90.0		225	
		250	12.75 {1.30}	100.0		250	
		275	11.59 {1.18}	110.0		275	
		300	10.62 {1.08}	120.0		300	
52	37	60	65.42 {6.67}	24.0	1570 {160}	SWS 52− 60	
		70	56.07 {5.72}	28.0		70	
		80	49.06 {5.00}	32.0		80	
		90	43.61 {4.45}	36.0		90	
		100	39.25 {4.00}	40.0		100	
		110	35.68 {3.64}	44.0		110	
		120	32.71 {3.34}	48.0		120	
		130	30.19 {3.08}	52.0		130	
		140	28.04 {2.86}	56.0		140	
		150	26.17 {2.67}	60.0		150	
		175	22.43 {2.29}	70.0		175	
		200	19.63 {2.00}	80.0		200	
		225	17.44 {1.78}	90.0		225	
		250	15.70 {1.60}	100.0		250	
		275	14.27 {1.46}	110.0		275	
		300	13.08 {1.33}	120.0		300	

COIL SPRINGS

—LOW DEFLECTION SWN—



Load	±10%
Squareness	3° or less
Free length L	50 or less±0.5mm 55 or more±1.5%

RoHS

Coil direction Right : Sectional drawing

Ⓘ For information on the D dimension and the counterbore hole, and also the d dimension and the shaft, ☞ P.1221

Ⓘ F(Allowable deflection) is due to the measurement at normal temperature (40℃). Refer to P.1220 for the maximum allowable deflection at high temperature (150℃/200℃).

D	d	L	Spring constant N/mm{kgf/mm}	F=L×30%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
14.5	8.5	20	45.76 {4.67}	6.0	274.6 {28.0}	SWN 14.5− 20	
		25	36.61 {3.73}	7.5		25	
		30	30.51 {3.11}	9.0		30	
		35	26.15 {2.67}	10.5		35	
		40	22.88 {2.33}	12.0		40	
		45	20.34 {2.07}	13.5		45	
		50	18.31 {1.87}	15.0		50	
		55	16.64 {1.70}	16.5		55	
		60	15.25 {1.56}	18.0		60	
		65	14.08 {1.44}	19.5		65	
		70	13.08 {1.33}	21.0		70	
		75	12.20 {1.24}	22.5		75	
		80	11.44 {1.17}	24.0		80	
		90	10.17 {1.04}	27.0		90	
		100	9.15 {0.93}	30.0		100	
		125	7.32 {0.75}	37.5		125	
		150	6.10 {0.62}	45.0		150	
17	10.5	25	49.69 {5.07}	7.5	372.7 {38.0}	SWN 17− 25	
		30	41.41 {4.22}	9.0		30	
		35	35.49 {3.62}	10.5		35	
		40	31.05 {3.17}	12.0		40	
		45	27.60 {2.81}	13.5		45	
		50	24.84 {2.53}	15.0		50	
		55	22.59 {2.30}	16.5		55	Quotation
		60	20.70 {2.11}	18.0		60	
		65	19.11 {1.95}	19.5		65	
		70	17.75 {1.81}	21.0		70	
		75	16.56 {1.69}	22.5		75	
		80	15.53 {1.58}	24.0		80	
		90	13.80 {1.41}	27.0		90	
		100	12.42 {1.27}	30.0		100	
		125	9.94 {1.01}	37.5		125	
		150	8.28 {0.84}	45.0		150	
21	13.5	30	54.48 {5.56}	9.0	490.3 {50.0}	SWN 21− 30	
		35	46.70 {4.76}	10.5		35	
		40	40.86 {4.17}	12.0		40	
		45	36.32 {3.70}	13.5		45	
		50	32.69 {3.33}	15.0		50	
		55	29.72 {3.03}	16.5		55	
		60	27.24 {2.78}	18.0		60	
		65	25.15 {2.56}	19.5		65	
		70	23.35 {2.38}	21.0		70	
		75	21.79 {2.22}	22.5		75	
		80	20.43 {2.08}	24.0		80	
		90	18.16 {1.85}	27.0		90	
		100	16.34 {1.67}	30.0		100	
		110	14.86 {1.52}	33.0		110	
		120	13.62 {1.39}	36.0		120	
		125	13.08 {1.33}	37.5		125	
		130	12.57 {1.28}	39.0		130	
		140	11.67 {1.19}	42.0		140	
		150	10.90 {1.11}	45.0		150	
		175	9.34 {0.95}	52.5		175	
		200	8.17 {0.83}	60.0		200	

D	d	L	Spring constant N/mm{kgf/mm}	F=L×30%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
26	16.5	30	76.27 {7.78}	9.0	686.5 {70.0}	SWN 26− 30	
		35	65.38 {6.67}	10.5		35	
		40	57.21 {5.83}	12.0		40	
		45	50.85 {5.19}	13.5		45	
		50	45.76 {4.67}	15.0		50	
		55	41.60 {4.24}	16.5		55	
		60	38.14 {3.89}	18.0		60	
		65	35.20 {3.59}	19.5		65	
		70	32.69 {3.33}	21.0		70	
		75	30.51 {3.11}	22.5		75	
		80	28.60 {2.92}	24.0		80	
		90	25.42 {2.59}	27.0		90	
		100	22.88 {2.33}	30.0		100	
		110	20.80 {2.12}	33.0		110	
		120	19.07 {1.94}	36.0		120	
		125	18.31 {1.87}	37.5		125	
		130	17.60 {1.79}	39.0		130	
		140	16.34 {1.67}	42.0		140	
		150	15.25 {1.56}	45.0		150	
		175	13.08 {1.33}	52.5		175	
		200	11.44 {1.17}	60.0		200	Quotation
		225	10.17 {1.04}	67.5		225	
		250	9.15 {0.93}	75.0		250	
31	21	40	69.46 {7.08}	12.0	833.6 {85.0}	SWN 31− 40	
		45	61.75 {6.3 }	13.5		45	
		50	55.57 {5.67}	15.0		50	
		55	50.52 {5.15}	16.5		55	
		60	46.31 {4.72}	18.0		60	
		65	42.75 {4.36}	19.5		65	
		70	39.69 {4.05}	21.0		70	
		75	37.05 {3.78}	22.5		75	
		80	34.73 {3.54}	24.0		80	
		90	30.87 {3.15}	27.0		90	
		100	27.79 {2.83}	30.0		100	
		110	25.26 {2.58}	33.0		110	
		120	23.15 {2.36}	36.0		120	
		125	22.23 {2.27}	37.5		125	
		130	21.37 {2.18}	39.0		130	
		140	19.85 {2.02}	42.0		140	
		150	18.52 {1.89}	45.0		150	
		160	17.37 {1.77}	48.0		160	
		170	16.34 {1.67}	51.0		170	
		175	15.88 {1.62}	52.5		175	
		180	15.44 {1.57}	54.0		180	
		190	14.62 {1.49}	57.0		190	
		200	13.89 {1.42}	60.0		200	
		250	11.11 {1.13}	75.0		250	
		300	9.26 {0.94}	90.0		300	

D	d	L	Spring constant N/mm{kgf/mm}	F=L×30%		Part Number	U/Price
				Fmm	Load N{kgf}	Type D−L	1~19
37	26	40	73.55 {7.50}	12.0	882.6 {90.0}	SWN 37− 40	
		45	65.38 {6.67}	13.5		45	
		50	58.84 {6.00}	15.0		50	
		55	53.49 {5.45}	16.5		55	
		60	49.03 {5.00}	18.0		60	
		65	45.26 {4.62}	19.5		65	
		70	42.03 {4.29}	21.0		70	
		75	39.23 {4.00}	22.5		75	
		80	36.77 {3.75}	24.0		80	
		90	32.69 {3.33}	27.0		90	Quotation
		100	29.42 {3.00}	30.0		100	
		110	26.75 {2.73}	33.0		110	
		120	24.52 {2.50}	36.0		120	
		125	23.54 {2.40}	37.5		125	
		130	22.63 {2.31}	39.0		130	
		140	21.01 {2.14}	42.0		140	
		150	19.61 {2.00}	45.0		150	
		160	18.39 {1.88}	48.0		160	
		170	17.31 {1.76}	51.0		170	
		175	16.81 {1.71}	52.5		175	
		180	16.34 {1.67}	54.0		180	
		190	15.48 {1.58}	57.0		190	
		200	14.71 {1.50}	60.0		200	
		250	11.77 {1.20}	75.0		250	
		300	9.81 {1.00}	90.0		300	

M Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

● Load calculation method: Load＝Spring constant×Deflection
(International unit) N＝N/mm×Fmm
kgf＝kgf/mm×Fmm
(kgf＝N×0.101972)

Ⓘ Times used: 1 million (300 thousand times for L×35%)

Ⓘ Product guide ☞ **P.1219**

Ⓘ Instructions and notes for coil springs ☞ **P.1221**

Ⓘ Load deflection diagram ☞ **P.1258**

Order Part Number
SWN21−100

Days to Ship Quotation

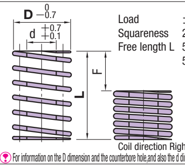
Price Quotation

Alterations ☎ **(NT) — Part Number**
NT — SWN 31−70
Quotation

Alteration	Code	Spec.	Details
 No painting	NT	**Paint peeling** Peel the coating by shot peening. Ⓘ Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Ⓘ Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	☞ P.1257

COIL SPRINGS

—EXTRA MINIMAL LOAD SWC—



Load ±10%
Squareness 2° or less
Free length L 50 or less±0.5mm
55 or more±1%

RoHS

Coil direction Right: :Sectional drawing

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×50%		F=L×55%		F=L×60%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
6	3	15	3.60{0.37}	7.5	27 {2.8}	8.3	30 {3.0}	Outside allowable range		SWC 6− 15	
		20	2.70{0.28}	10.0		11.0				20	
		25	2.16{0.22}	12.5		13.8		15.0	32 {3.3}	25	
		30	1.80{0.18}	15.0		16.5		18.0		30	
		35	1.54{0.16}	17.5		19.3		21.0		35	
		40	1.35{0.14}	20.0		22.0		24.0		40	
8	4.6	15	3.81{0.39}	7.5	29 {2.9}	8.3	31 {3.2}	Outside allowable range		SWC 8− 15	
		20	2.86{0.29}	10.0		11.0		12.0	34 {3.5}	20	
		25	2.29{0.23}	12.5		13.8		15.0		25	
		30	1.91{0.19}	15.0		16.5		18.0		30	
		35	1.63{0.17}	17.5		19.3		21.0		35	
		40	1.43{0.15}	20.0		22.0		24.0		40	
		45	1.27{0.13}	22.5		24.8		27.0		45	
		50	1.14{0.12}	25.0		27.5		30.0		50	
		55	1.04{0.11}	27.5		30.3		33.0		55	
		60	0.95{0.10}	30.0		33.0		36.0		60	
		65	0.88{0.09}	32.5		35.8		39.0		65	
		70	0.82{0.08}	35.0		38.5		42.0		70	
		75	0.76{0.08}	37.5		41.3		45.0		75	
		80	0.72{0.07}	40.0		44.0		48.0		80	
10	5.8	15	6.10{0.62}	7.5	46 {4.7}	8.3	50 {5.1}	Outside allowable range		SWC 10− 15	
		20	4.58{0.47}	10.0		11.0		12.0	55 {5.6}	20	
		25	3.66{0.37}	12.5		13.8		15.0		25	
		30	3.05{0.31}	15.0		16.5		18.0		30	
		35	2.62{0.27}	17.5		19.3		21.0		35	
		40	2.29{0.23}	20.0		22.0		24.0		40	
		45	2.03{0.21}	22.5		24.8		27.0		45	
		50	1.83{0.19}	25.0		27.5		30.0		50	
		55	1.66{0.17}	27.5		30.3		33.0		55	
		60	1.53{0.16}	30.0		33.0		36.0		60	Quotation
		65	1.41{0.14}	32.5		35.8		39.0		65	
		70	1.31{0.13}	35.0		38.5		42.0		70	
		75	1.22{0.12}	37.5		41.3		45.0		75	
		80	1.14{0.12}	40.0		44.0		48.0		80	
		90	1.02{0.10}	45.0		49.5		54.0		90	
12	7.4	20	5.48{0.56}	10.0	55 {5.6}	11.0	60 {6.1}	Outside allowable range		SWC 12− 20	
		25	4.38{0.45}	12.5		13.8		15.0	66 {6.7}	25	
		30	3.65{0.37}	15.0		16.5		18.0		30	
		35	3.13{0.32}	17.5		19.3		21.0		35	
		40	2.74{0.28}	20.0		22.0		24.0		40	
		45	2.43{0.25}	22.5		24.8		27.0		45	
		50	2.19{0.22}	25.0		27.5		30.0		50	
		55	1.99{0.20}	27.5		30.3		33.0		55	
		60	1.83{0.19}	30.0		33.0		36.0		60	
		65	1.68{0.17}	32.5		35.8		39.0		65	
		70	1.56{0.16}	35.0		38.5		42.0		70	
		75	1.46{0.15}	37.5		41.3		45.0		75	
		80	1.37{0.14}	40.0		44.0		48.0		80	
		90	1.22{0.12}	45.0		49.5		54.0		90	
14	8.5	25	8.17{0.83}	12.5	102 {10.4}	13.8	112 {11.4}	Outside allowable range		SWC 14− 25	
		30	6.81{0.69}	15.0		16.5		18.0	123 {12.5}	30	
		35	5.84{0.60}	17.5		19.3		21.0		35	
		40	5.11{0.52}	20.0		22.0		24.0		40	
		45	4.54{0.46}	22.5		24.8		27.0		45	
		50	4.09{0.42}	25.0		27.5		30.0		50	
		55	3.71{0.38}	27.5		30.3		33.0		55	
		60	3.41{0.35}	30.0		33.0		36.0		60	
		65	3.14{0.32}	32.5		35.8		39.0		65	
		70	2.92{0.30}	35.0		38.5		42.0		70	
		75	2.72{0.28}	37.5		41.3		45.0		75	
		80	2.55{0.26}	40.0		44.0		48.0		80	
		90	2.27{0.23}	45.5		49.5		54.0		90	
		100	2.04{0.21}	50.0		55.0		60.0		100	
Operation frequency				One million times		500,000 times		300,000 times			

M Equivalent of SWOSC—V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

Product guide P.1219
Instructions and notes for coil springs P.1221
Load deflection diagram P.1258

D	d	L	Spring constant N/mm{kgf/mm}	F=L×50%		F=L×55%		F=L×60%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
16	9.5	25	9.15{0.93}	12.5	114 {11.7}	13.8	126 {12.8}	Outside allowable range		SWC 16− 25	
		30	7.63{0.78}	15.0		16.5		18.0	137 {14.0}	30	
		35	6.54{0.67}	17.5		19.3		21.0		35	
		40	5.72{0.58}	20.0		22.0		24.0		40	
		45	5.08{0.52}	22.5		24.8		27.0		45	
		50	4.58{0.47}	25.0		27.5		30.0		50	
		55	4.16{0.42}	27.5		30.3		33.0		55	
		60	3.81{0.39}	30.0		33.0		36.0		60	
		65	3.52{0.36}	32.5		35.8		39.0		65	
		70	3.27{0.33}	35		38.5		42.0		70	
		75	3.05{0.31}	37.5		41.3		45.0		75	
		80	2.86{0.29}	40.0		44.0		48.0		80	
		90	2.54{0.26}	45.0		49.5		54.0		90	
		100	2.29{0.23}	50.0		55.0		60.0		100	
		125	1.83{0.19}	62.5		68.8		75.0		125	
18	11	25	10.46{1.07}	12.5	131 {13.3}	13.8	144 {14.7}	Outside allowable range		SWC 18− 25	
		30	8.72{0.89}	15.0		16.5		18.0	157 {16.0}	30	
		35	7.47{0.76}	17.5		19.3		21.0		35	
		40	6.54{0.67}	20.0		22.0		24.0		40	
		45	5.81{0.59}	22.5		24.8		27.0		45	
		50	5.23{0.53}	25.0		27.5		30.0		50	
		55	4.75{0.48}	27.5		30.3		33.0		55	
		60	4.36{0.44}	30.0		33.0		36.0		60	
		65	4.02{0.41}	32.5		35.8		39.0		65	
		70	3.74{0.38}	35.0		38.5		42.0		70	
		75	3.49{0.36}	37.5		41.3		45.0		75	
		80	3.27{0.33}	40.0		44.0		48.0		80	
		90	2.91{0.30}	45.0		49.5		54.0		90	
		100	2.62{0.27}	50.0		55.0		60.0		100	Quotation
		125	2.09{0.21}	62.5		68.8		75.0		125	
20	12.5	25	14.38{1.47}	12.5	180 {18.3}	13.8	198 {20.2}	Outside allowable range		SWC 20− 25	
		30	11.99{1.22}	15.0		16.5		18.0	216 {22.0}	30	
		35	10.27{1.05}	17.5		19.3		21.0		35	
		40	8.99{0.92}	20.0		22.0		24.0		40	
		45	7.99{0.81}	22.5		24.8		27.0		45	
		50	7.19{0.73}	25.0		27.5		30.0		50	
		55	6.54{0.67}	27.5		30.3		33.0		55	
		60	5.99{0.61}	30.0		33.0		36.0		60	
		65	5.53{0.56}	32.5		35.8		39.0		65	
		70	5.14{0.52}	35.0		38.5		42.0		70	
		75	4.79{0.49}	37.5		41.3		45.0		75	
		80	4.49{0.46}	40.0		44.0		48.0		80	
		90	4.00{0.41}	45.5		49.5		54.0		90	
		100	3.60{0.37}	50.0		55.0		60.0		100	
		125	2.88{0.29}	62.5		68.8		75.0		125	
		150	2.40{0.24}	75.0		82.5		90.0		150	
22	13.5	25	19.61{2.00}	12.5	245 {25.0}	13.8	270 {27.5}	Outside allowable range		SWC 22− 25	
		30	16.34{1.67}	15.0		16.5		18.0	294 {30.0}	30	
		35	14.01{1.43}	17.5		19.3		21.0		35	
		40	12.26{1.25}	20.0		22.0		24.0		40	
		45	10.90{1.11}	22.5		24.8		27.0		45	
		50	9.81{1.00}	25.0		27.5		30.0		50	
		55	8.92{0.91}	27.5		30.3		33.0		55	
		60	8.17{0.83}	30.0		33.0		36.0		60	
		65	7.54{0.77}	32.5		35.8		39.0		65	
		70	7.00{0.71}	35.0		38.5		42.0		70	
		75	6.54{0.67}	37.5		41.3		45.0		75	
		80	6.13{0.63}	40.0		44.0		48.0		80	
		90	5.45{0.56}	45.0		49.5		54.0		90	
		100	4.90{0.50}	50.0		55.0		60.0		100	
		125	3.92{0.40}	62.5		68.8		75.0		125	
		150	3.27{0.33}	75.0		82.5		90.0		150	
Operation frequency				One million times		500,000 times		300,000 times			

The maximum deflection of shapes marked with "Outside allowable range" is 55%.
Avoid using when deflection is more than 55%.

D	d	L	Spring constant N/mm{kgf/mm}	F=L×50%		F=L×55%		F=L×60%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
25	16	25	24.19{2.47}	12.5	302 {30.8}	13.8	333 {33.9}	Outside allowable range		SWC 25− 25	
		30	20.16{2.06}	15.0		16.5		18.0	363 {37.0}	30	
		35	17.28{1.76}	17.5		19.3		21.0		35	
		40	15.12{1.54}	20.0		22.0		24.0		40	
		45	13.44{1.37}	22.5		24.8		27.0		45	
		50	12.09{1.23}	25.0		27.5		30.0		50	
		55	11.00{1.12}	27.5		30.3		33.0		55	
		60	10.08{1.03}	30.0		33.0		36.0		60	
		65	9.30{0.95}	32.5		35.8		39.0		65	
		70	8.64{0.88}	35.0		38.5		42.0		70	
		75	8.06{0.82}	37.5		41.3		45.0		75	
		80	7.56{0.77}	40.0		44.0		48.0		80	
		90	6.72{0.69}	45.0		49.5		54.0		90	
		100	6.05{0.62}	50.0		55.0		60.0		100	
		125	4.84{0.49}	62.5		68.8		75.0		125	
		150	4.03{0.41}	75.0		82.5		90.0		150	
		175	3.46{0.35}	87.5		96.3		105.0		175	
		200	3.02{0.31}	100.0		110.0		120.0		200	
27	17.5	25	28.11{2.87}	12.5	351 {35.8}	13.8	387 {39.4}	Outside allowable range		SWC 27− 25	
		30	23.43{2.39}	15.0		16.5		18.0	422 {43.0}	30	
		35	20.08{2.05}	17.5		19.3		21.0		35	
		40	17.57{1.79}	20.0		22.0		24.0		40	
		45	15.62{1.59}	22.5		24.8		27.0		45	
		50	14.06{1.43}	25.0		27.5		30.0		50	
		55	12.78{1.30}	27.5		30.3		33.0		55	Quotation
		60	11.71{1.19}	30.0		33.0		36.0		60	
		65	10.81{1.10}	32.5		35.8		39.0		65	
		70	10.04{1.02}	35.0		38.5		42.0		70	
		75	9.37{0.96}	37.5		41.3		45.0		75	
		80	8.79{0.90}	40.0		44.0		48.0		80	
		90	7.81{0.80}	45.0		49.5		54.0		90	
		100	7.03{0.72}	50.0		55.0		60.0		100	
		125	5.62{0.57}	62.5		68.8		75.0		125	
		150	4.69{0.48}	75.0		82.5		90.0		150	
		175	4.02{0.41}	87.5		96.3		105.0		175	
		200	3.51{0.36}	100.0		110.0		120.0		200	
30	20	25	31.38{3.20}	12.5	392 {40.0}	13.8	431 {44.0}	Outside allowable range		SWC 30− 25	
		30	26.15{2.67}	15.0		16.5		18.0	471 {48.0}	30	
		35	22.42{2.29}	17.5		19.3		21.0		35	
		40	19.61{2.00}	20.0		22.0		24.0		40	
		45	17.43{1.78}	22.5		24.8		27.0		45	
		50	15.69{1.60}	25.0		27.5		30.0		50	
		55	14.26{1.45}	27.5		30.3		33.0		55	
		60	13.08{1.33}	30.0		33.0		36.0		60	
		65	12.07{1.23}	32.5		35.8		39.0		65	
		70	11.21{1.14}	35.0		38.5		42.0		70	
		75	10.46{1.07}	37.5		41.3		45.0		75	
		80	9.81{1.00}	40.0		44.0		48.0		80	
		90	8.72{0.89}	45.0		49.5		54.0		90	
		100	7.85{0.80}	50.0		55.0		60.0		100	
		125	6.28{0.64}	62.5		68.8		75.0		125	
		150	5.23{0.53}	75.0		82.5		90.0		150	
		175	4.48{0.46}	87.5		96.3		105.0		175	
		200	3.92{0.40}	100.0		110.0		120.0		200	
Operation frequency				One million times		500,000 times		300,000 times			

Order	**Part Number** SWC10—30
Days to Ship	Quotation
Price	Quotation

Alterations

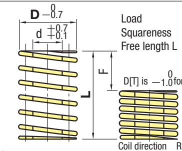
(NT) — **Part Number**
NT — SWC 10—30

Quotation

Alteration	**Paint peeling** No painting
Code	NT
Spec.	Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.
Details	P.1257

COIL SPRINGS

—MINIMAL LOAD SWF—



Load ±10%

Squareness 2° or less

Free length L 50 or less±0.5mm

55 or more±1%

D[T] is $^{0}_{-1.0}$ for ϕ70.

Coil direction Right: Sectional drawing

RoHS

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		F=L×45%		F=L×50%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
6	3	15	7.8{0.80}	6.0	47 {4.8}	6.8	53 {5.4}	7.5	59 {6.0}	SWF 6− 15	
		20	5.9{0.60}	8.0		9.0		10.0		20	
		25	4.7{0.48}	10.0		11.3		12.5		25	
		30	3.9{0.40}	12.0		13.5		15.0		30	
		35	3.4{0.34}	14.0		15.8		17.5		35	
		40	2.9{0.30}	16.0		18.0		20.0		40	
8	4	10	15.7{1.60}	4.0	63 {6.4}	4.5	71 {7.2}	5.0	79 {8.0}	SWF 8− 10	
		15	10.5{1.07}	6.0		6.8		7.5		15	
		20	7.8{0.80}	8.0		9.0		10.0		20	
		25	6.3{0.64}	10.0		11.2		12.5		25	
		30	5.2{0.53}	12.0		13.5		15.0		30	
		35	4.5{0.46}	14.0		15.7		17.5		35	
		40	3.9{0.40}	16.0		18.0		20.0		40	
		45	3.5{0.36}	18.0		20.2		22.5		45	
		50	3.1{0.32}	20.0		22.5		25.0		50	
		55	2.9{0.29}	22.0		24.7		27.5		55	
		60	2.6{0.27}	24.0		27.0		30.0		60	
		65	2.4{0.25}	26.0		29.3		32.5		65	
		70	2.2{0.23}	28.0		31.5		35.0		70	
		75	2.1{0.21}	30.0		33.8		37.5		75	
		80	2.0{0.20}	32.0		36.0		40.0		80	
10	5	10	19.6{2.00}	4.0	78 {8.0}	4.5	88 {9.0}	5.0	98 {10}	SWF 10− 10	
		15	13.1{1.33}	6.0		6.8		7.5		15	
		20	9.8{1.00}	8.0		9.0		10.0		20	
		25	7.8{0.80}	10.0		11.2		12.5		25	
		30	6.5{0.67}	12.0		13.5		15.0		30	
		35	5.9{0.57}	14.0		15.7		17.5		35	
		40	4.9{0.50}	16.0		18.0		20.0		40	
		45	4.4{0.44}	18.0		20.2		22.5		45	
		50	3.9{0.40}	20.0		22.5		25.0		50	
		55	3.6{0.36}	22.0		24.7		27.5		55	Quotation
		60	3.3{0.33}	24.0		27.0		30.0		60	
		65	3.0{0.31}	26.0		29.2		32.5		65	
		70	2.8{0.29}	28.0		31.5		35.0		70	
		75	2.6{0.27}	30.0		33.7		37.5		75	
		80	2.5{0.25}	32.0		36.0		40.0		80	
		90	2.2{0.22}	36.0		40.5		45.0		90	
12	6	15	18.3{1.87}	6.0	110 {11}	6.8	124 {13}	7.5	137 {14}	SWF 12− 15	
		20	13.7{1.40}	8.0		9.0		10.0		20	
		25	11.0{1.12}	10.0		11.2		12.5		25	
		30	9.2{0.93}	12.0		13.5		15.0		30	
		35	7.8{0.80}	14.0		15.7		17.5		35	
		40	6.9{0.70}	16.0		18.0		20.0		40	
		45	6.1{0.62}	18.0		20.2		22.5		45	
		50	5.5{0.56}	20.0		22.5		25.0		50	
		55	5.0{0.51}	22.0		24.7		27.5		55	
		60	4.6{0.47}	24.0		27.0		30.0		60	
		65	4.2{0.43}	26.0		29.2		32.5		65	
		70	3.9{0.40}	28.0		31.5		35.0		70	
		75	3.7{0.37}	30.0		33.7		37.5		75	
		80	3.4{0.35}	32.0		36.0		40.0		80	
		90	3.1{0.31}	36.0		40.5		45.0		90	
14	7	20	17.7{1.80}	8.0	141 {14}	9.0	159 {16}	10.0	177 {18}	SWF 14− 20	
		25	14.1{1.44}	10.0		11.2		12.5		25	
		30	11.8{1.20}	12.0		13.5		15.0		30	
		35	10.1{1.03}	14.0		15.7		17.5		35	
		40	8.8{0.90}	16.0		18.0		20.0		40	
		45	7.8{0.80}	18.0		20.2		22.5		45	
		50	7.1{0.72}	20.0		22.5		25.0		50	
		55	6.4{0.65}	22.0		24.7		27.5		55	
		60	5.9{0.60}	24.0		27.0		30.0		60	
		65	5.4{0.55}	26.0		29.2		32.5		65	
		70	5.0{0.51}	28.0		31.5		35.0		70	
		75	4.7{0.48}	30.0		33.7		37.5		75	
		80	4.4{0.45}	32.0		36.0		40.0		80	
		90	3.9{0.40}	36.0		40.5		45.0		90	
		100	3.5{0.36}	40.0		45.0		50.0		100	
Operation frequency				One million times		500,000 times		300,000 times			

Ⓜ Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection

(International unit) N=N/mm×Fmm

kgf=kgf/mm×Fmm

(kgf=N×0.101972)

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		F=L×45%		F=L×50%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
16	8	20	20.6{2.10}	8.0	165 {17}	9.0	185 {19}	10.0	206 {21}	SWF 16− 20	
		25	16.5{1.68}	10.0		11.2		12.5		25	
		30	13.7{1.40}	12.0		13.5		15.0		30	
		35	11.8{1.20}	14.0		15.7		17.5		35	
		40	10.3{1.05}	16.0		18.0		20.0		40	
		45	9.2{0.93}	18.0		20.2		22.5		45	
		50	8.2{0.84}	20.0		22.5		25.0		50	
		55	7.5{0.76}	22.0		24.7		27.5		55	
		60	6.9{0.70}	24.0		27.0		30.0		60	
		65	6.3{0.65}	26.0		29.2		32.5		65	
		70	5.9{0.60}	28.0		31.5		35.0		70	
		75	5.5{0.56}	30.0		33.7		37.5		75	
		80	5.1{0.53}	32.0		36.0		40.0		80	
		90	4.6{0.47}	36.0		40.5		45.0		90	
		100	4.1{0.42}	40.0		45.0		50.0		100	
		125	3.3{0.34}	50.0		56.3		62.5		125	
18	9	20	25.5{2.60}	8.0	204 {21}	9.0	229 {23}	10.0	255 {26}	SWF 18− 20	
		25	20.4{2.08}	10.0		11.2		12.5		25	
		30	17.0{1.73}	12.0		13.5		15.0		30	
		35	14.6{1.49}	14.0		15.7		17.5		35	
		40	12.7{1.30}	16.0		18.0		20.0		40	
		45	11.3{1.16}	18.0		20.2		22.5		45	
		50	10.2{1.04}	20.0		22.5		25.0		50	
		55	9.3{0.95}	22.0		24.7		27.5		55	
		60	8.5{0.87}	24.0		27.0		30.0		60	
		65	7.8{0.80}	26.0		29.2		32.5		65	
		70	7.3{0.74}	28.0		31.5		35.0		70	
		75	6.8{0.69}	30.0		33.7		37.5		75	
		80	6.4{0.65}	32.0		36.0		40.0		80	
		90	5.7{0.58}	36.0		40.5		45.0		90	Quotation
		100	5.1{0.52}	40.0		45.0		50.0		100	
		125	4.1{0.42}	50.0		56.3		62.5		125	
20	11	20	31.4{3.20}	8.0	251 {26}	9.0	282 {29}	10.0	314 {32}	SWF 20− 20	
		25	25.1{2.56}	10.0		11.2		12.5		25	
		30	20.9{2.13}	12.0		13.5		15.0		30	
		35	17.9{1.83}	14.0		15.7		17.5		35	
		40	15.7{1.60}	16.0		18.0		20.0		40	
		45	13.9{1.42}	18.0		20.2		22.5		45	
		50	12.6{1.28}	20.0		22.5		25.0		50	
		55	11.4{1.16}	22.0		24.7		27.5		55	
		60	10.5{1.07}	24.0		27.0		30.0		60	
		65	9.7{0.98}	26.0		29.2		32.5		65	
		70	9.0{0.91}	28.0		31.5		35.0		70	
		75	8.4{0.85}	30.0		33.7		37.5		75	
		80	7.8{0.80}	32.0		36.0		40.0		80	
		90	7.0{0.71}	36.0		40.5		45.0		90	
		100	6.3{0.64}	40.0		45.0		50.0		100	
		125	5.0{0.51}	50.0		56.2		62.5		125	
		150	4.2{0.43}	60.0		67.5		75.0		150	
22	11	25	31.4{3.20}	10.0	314 {32}	11.2	353 {36}	12.5	392 {40}	SWF 22− 25	
		30	26.2{2.67}	12.0		13.5		15.0		30	
		35	22.4{2.29}	14.0		15.7		17.5		35	
		40	19.6{2.00}	16.0		18.0		20.0		40	
		45	17.4{1.78}	18.0		20.2		22.5		45	
		50	15.7{1.60}	20.0		22.5		25.0		50	
		55	14.3{1.45}	22.0		24.7		27.5		55	
		60	13.1{1.33}	24.0		27.0		30.0		60	
		65	12.1{1.23}	26.0		29.2		32.5		65	
		70	11.2{1.14}	28.0		31.5		35.0		70	
		75	10.5{1.07}	30.0		33.7		37.5		75	
		80	9.8{1.00}	32.0		36.0		40.0		80	
		90	8.7{0.89}	36.0		40.5		45.0		90	
		100	7.8{0.80}	40.0		45.0		50.0		100	
		125	6.3{0.64}	50.0		56.2		62.5		125	
		150	5.2{0.53}	60.0		67.5		75.0		150	
Operation frequency				One million times		500,000 times		300,000 times			

Order

Part Number
SWF10−30

Days to Ship Quotation

Price Quotation

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		F=L×45%		F=L×50%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
25	13.5	25	39.2{4.00}	10.0	392 {40}	11.2	441 {45}	12.5	490 {50}	SWF 25− 25	
		30	32.7{3.33}	12.0		13.5		15.0		30	
		35	28.0{2.86}	14.0		15.7		17.5		35	
		40	24.5{2.50}	16.0		18.0		20.0		40	
		45	21.8{2.22}	18.0		20.2		22.5		45	
		50	19.6{2.00}	20.0		22.5		25.0		50	
		55	17.8{1.82}	22.0		24.7		27.5		55	
		60	16.3{1.67}	24.0		27.0		30.0		60	
		65	15.1{1.54}	26.0		29.2		32.5		65	
		70	14.0{1.43}	28.0		31.5		35.0		70	
		75	13.1{1.33}	30.0		33.7		37.5		75	
		80	12.3{1.25}	32.0		36.0		40.0		80	
		90	10.9{1.11}	36.0		40.5		45.0		90	
		100	9.8{1.00}	40.0		45.0		50.0		100	
		125	7.8{0.80}	50.0		56.2		62.5		125	
		150	6.5{0.67}	60.0		67.5		75.0		150	
		175	5.6{0.57}	70.0		78.7		87.5		175	
		200	4.9{0.50}	80.0		90.0		100.0		200	
27	13.5	25	47.1{4.80}	10.0	471 {48}	11.2	530 {54}	12.5	588 {60}	SWF 27− 25	
		30	39.2{4.00}	12.0		13.5		15.0		30	
		35	33.6{3.43}	14.0		15.7		17.5		35	
		40	29.4{3.00}	16.0		18.0		20.0		40	
		45	26.2{2.67}	18.0		20.2		22.5		45	
		50	23.5{2.40}	20.0		22.5		25.0		50	
		55	21.4{2.18}	22.0		24.7		27.5		55	
		60	19.6{2.00}	24.0		27.0		30.0		60	
		65	18.1{1.85}	26.0		29.2		32.5		65	
		70	16.8{1.71}	28.0		31.5		35.0		70	
		75	15.7{1.60}	30.0		33.7		37.5		75	
		80	14.7{1.50}	32.0		36.0		40.0		80	
		90	13.1{1.33}	36.0		40.5		45.0		90	
		100	11.8{1.20}	40.0		45.0		50.0		100	Quotation
		125	9.4{0.96}	50.0		56.2		62.5		125	
		150	7.8{0.80}	60.0		67.5		75.0		150	
		175	6.7{0.69}	70.0		78.7		87.5		175	
		200	5.9{0.60}	80.0		90.0		100.0		200	
30	16	25	56.5{5.76}	10.0	565 {58}	11.2	635 {65}	12.5	706 {72}	SWF 30− 25	
		30	47.1{4.80}	12.0		13.5		15.0		30	
		35	40.3{4.11}	14.0		15.7		17.5		35	
		40	35.3{3.60}	16.0		18.0		20.0		40	
		45	31.4{3.20}	18.0		20.2		22.5		45	
		50	28.2{2.88}	20.0		22.5		25.0		50	
		55	25.7{2.62}	22.0		24.7		27.5		55	
		60	23.5{2.40}	24.0		27.0		30.0		60	
		65	21.7{2.22}	26.0		29.2		32.5		65	
		70	20.2{2.06}	28.0		31.5		35.0		70	
		75	18.8{1.92}	30.0		33.7		37.5		75	
		80	17.7{1.80}	32.0		36.0		40.0		80	
		90	15.7{1.60}	36.0		40.5		45.0		90	
		100	14.1{1.44}	40.0		45.0		50.0		100	
		125	11.3{1.15}	50.0		56.2		62.5		125	
		150	9.4{0.96}	60.0		67.5		75.0		150	
		175	8.1{0.82}	70.0		78.7		87.5		175	
		200	7.1{0.72}	80.0		90.0		100.0		200	
35	19	40	48.0{4.89}	16.0	768 {78}	18.0	864 {88}	20.0	960 {98}	SWF 35− 40	
		45	42.7{4.35}	18.0		20.2		22.5		45	
		50	38.4{3.92}	20.0		22.5		25.0		50	
		55	34.9{3.56}	22.0		24.7		27.5		55	
		60	32.0{3.26}	24.0		27.0		30.0		60	
		65	29.5{3.01}	26.0		29.2		32.5		65	
		70	27.4{2.80}	28.0		31.5		35.0		70	
		75	25.6{2.61}	30.0		33.7		37.5		75	
		80	24.0{2.45}	32.0		36.0		40.0		80	
		90	21.3{2.18}	36.0		40.5		45.0		90	
		100	19.2{1.96}	40.0		45.0		50.0		100	
		125	15.4{1.57}	50.0		56.2		62.5		125	
		150	12.8{1.31}	60.0		67.5		75.0		150	
		175	11.0{1.12}	70.0		78.7		87.5		175	
		200	9.6{0.98}	80.0		90.0		100.0		200	
Operation frequency				One million times		500,000 times		300,000 times			

- Product guide P.1219
- Instructions and notes for coil springs P.1221
- Load deflection diagram P.1258

D	d	L	Spring constant N/mm{kgf/mm}	F=L×40%		F=L×45%		F=L×50%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
40	22	40	62.7 {6.39}	16.0	1003 {102}	18.0	1129 {115}	20.0	1254 {128}	SWF 40− 40	
		45	55.7 {5.68}	18.0		20.3		22.5		45	
		50	50.2 {5.11}	20.0		22.5		25.0		50	
		55	45.6 {4.65}	22.0		24.8		27.5		55	
		60	41.8 {4.26}	24.0		27.0		30.0		60	
		65	38.6 {3.93}	26.0		29.3		32.5		65	
		70	35.8 {3.65}	28.0		31.5		35.0		70	
		75	33.4 {3.41}	30.0		33.8		37.5		75	
		80	31.4 {3.20}	32.0		36.0		40.0		80	
		90	27.9 {2.84}	36.0		40.5		45.0		90	
		100	25.1 {2.56}	40.0		45.0		50.0		100	
		125	20.1 {2.05}	50.0		56.2		62.5		125	
		150	16.7 {1.70}	60.0		67.5		75.0		150	
		175	14.3 {1.46}	70.0		78.7		87.5		175	
		200	12.5 {1.28}	80.0		90.0		100.0		200	
		225	11.1 {1.14}	90.0		101.3		112.5		225	
		250	10.0 {1.02}	100.0		112.5		125.0		250	
		275	9.1 {0.93}	110.0		123.8		137.5		275	
		300	8.4 {0.85}	120.0		135.0		150.0		300	
50	27.5	50	78.4 {7.99}	20.0	1568 {160}	22.5	1764 {180}	25.0	1960 {200}	SWF 50− 50	
		55	71.3 {7.27}	22.0		24.8		27.5		55	
		60	65.3 {6.66}	24.0		27.0		30.0		60	
		65	60.3 {6.15}	26.0		29.3		32.5		65	
		70	56.0 {5.71}	28.0		31.5		35.0		70	
		75	52.3 {5.33}	30.0		33.8		37.5		75	
		80	49.0 {5.00}	32.0		36.0		40.0		80	
		90	43.6 {4.44}	36.0		40.5		45.0		90	
		100	39.2 {4.00}	40.0		45.0		50.0		100	
		125	31.4 {3.20}	50.0		56.2		62.5		125	
		150	26.1 {2.66}	60.0		67.5		75.0		150	
		175	22.4 {2.28}	70.0		78.7		87.5		175	
		200	19.6 {2.00}	80.0		90.0		100.0		200	Quotation
		225	17.4 {1.78}	90.0		101.3		112.5		225	
		250	15.7 {1.60}	100.0		112.5		125.0		250	
		275	14.3 {1.45}	110.0		123.8		137.5		275	
		300	13.1 {1.33}	120.0		135.0		150.0		300	
		350	11.2 {1.14}	140.0		157.5		175.0		350	
		400	9.8 {1.00}	160.0		180.0		200.0		400	
		450	8.7 {0.89}	180.0		202.5		225.0		450	
		500	7.8 {0.80}	200.0		225.0		250.0		500	
60	33	60	94.0 {9.59}	24.0	2256 {230}	27.0	2538 {259}	30.0	2820 {288}	SWF 60− 60	
		70	80.6 {8.22}	28.0		31.5		35.0		70	
		80	70.5 {7.19}	32.0		36.0		40.0		80	
		90	62.7 {6.39}	36.0		40.0		45.0		90	
		100	56.4 {5.75}	40.0		45.0		50.0		100	
		125	45.1 {4.60}	50.0		56.2		62.5		125	
		150	37.6 {3.83}	60.0		67.5		75.0		150	
		175	32.2 {3.29}	70.0		78.7		87.5		175	
		200	28.2 {2.88}	80.0		90.0		100.0		200	
		225	25.1 {2.56}	90.0		101.3		112.5		225	
		250	22.6 {2.30}	100.0		112.5		125.0		250	
		275	20.5 {2.09}	110.0		123.8		137.5		275	
		300	18.8 {1.92}	120.0		135.0		150.0		300	
		350	16.1 {1.64}	140.0		157.5		175.0		350	
		400	14.1 {1.44}	160.0		180.0		200.0		400	
		450	12.5 {1.28}	180.0		202.5		225.0		450	
		500	11.3 {1.15}	200.0		225.0		250.0		500	
70	38.5	70	112 {11.4}	28.0	3136 {320}	31.5	3528 {360}	35.0	3920 {400}	SWF 70− 70	
		80	98.0 {9.99}	32.0		36.0		40.0		80	
		90	87.1 {8.88}	36.0		40.5		45.0		90	
		100	78.4 {7.99}	40.0		45.0		50.0		100	
		125	62.7 {6.40}	50.0		56.3		62.5		125	
		150	52.3 {5.33}	60.0		67.5		75.0		150	
		175	44.8 {4.57}	70.0		78.8		87.5		175	
		200	39.2 {4.00}	80.0		90.0		100.0		200	
		250	31.4 {3.20}	100.0		112.5		125.0		250	
		300	26.1 {2.66}	120.0		135.0		150.0		300	
		350	22.4 {2.28}	140.0		157.5		175.0		350	
Operation frequency				One million times		500,000 times		300,000 times			

Alterations

(NT) — Part Number

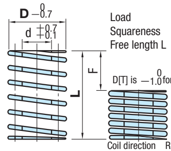
NT — SWF 30−80

Quotation

Alteration	Code	Spec.	Details
 No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

COIL SPRING

—LIGHT LOAD SWL—


D $^{0}_{-0.7}$
d $^{+0.7}_{+0.1}$
F
L
D[T] is $^{0}_{-1.0}$ for φ70.
Coil direction Right: Sectional drawing

Load ±10% RoHS
Squareness 2° or less
Free length L 50 or less±0.5mm
55 or more±1%

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×32% Fmm	F=L×32% Load N{kgf}	F=L×36% Fmm	F=L×36% Load N{kgf}	F=L×40% Fmm	F=L×40% Load N{kgf}	Part Number Type D−L	U/Price 1~19
6	3	15	13.1 {1.33}	4.8	63 {6.4}	5.4	71 {7.2}	6.0	78 {8.0}	SWL 6− 15	
		20	9.8 {1.00}	6.4		7.2		8.0		20	
		25	7.8 {0.80}	8.0		9.0		10.0		25	
		30	6.5 {0.67}	9.6		10.8		12.0		30	
		35	5.6 {0.57}	11.2		12.6		14.0		35	
		40	4.9 {0.50}	12.8		14.4		16.0		40	
8	4	10	24.5 {2.50}	3.2	78 {8.0}	3.6	88 {9.0}	4.0	98 {10}	SWL 8− 10	
		15	16.3 {1.67}	4.8		5.4		6.0		15	
		20	12.3 {1.25}	6.4		7.2		8.0		20	
		25	9.8 {1.00}	8.0		9.0		10.0		25	
		30	8.2 {0.83}	9.6		10.8		12.0		30	
		35	7.0 {0.71}	11.2		12.6		14.0		35	
		40	6.1 {0.63}	12.8		14.4		16.0		40	
		45	5.4 {0.56}	14.4		16.2		18.0		45	
		50	4.9 {0.50}	16.0		18.0		20.0		50	
		55	4.5 {0.45}	17.6		19.8		22.0		55	
		60	4.1 {0.42}	19.2		21.6		24.0		60	
		65	3.8 {0.38}	20.8		23.4		26.0		65	
		70	3.5 {0.36}	22.4		25.2		28.0		70	
		75	3.3 {0.33}	24.0		27.0		30.0		75	
		80	3.1 {0.31}	25.6		28.8		32.0		80	
10	5	10	34.3 {3.50}	3.2	110 {11}	3.6	124 {13}	4.0	137 {14}	SWL 10− 10	
		15	22.9 {2.33}	4.8		5.4		6.0		15	
		20	17.2 {1.75}	6.4		7.2		8.0		20	
		25	13.7 {1.40}	8.0		9.0		10.0		25	
		30	11.4 {1.17}	9.6		10.8		12.0		30	
		35	9.8 {1.00}	11.2		12.6		14.0		35	
		40	8.6 {0.88}	12.8		14.4		16.0		40	
		45	7.6 {0.78}	14.4		16.2		18.0		45	
		50	6.9 {0.70}	16.0		18.0		20.0		50	
		55	6.2 {0.64}	17.6		19.8		22.0		55	Quotation
		60	5.7 {0.58}	19.2		21.6		24.0		60	
		65	5.3 {0.54}	20.8		23.4		26.0		65	
		70	4.9 {0.50}	22.4		25.2		28.0		70	
		75	4.6 {0.47}	24.0		27.0		30.0		75	
		80	4.3 {0.44}	25.6		28.8		32.0		80	
		90	3.8 {0.39}	28.8		32.4		36.0		90	
12	6	15	34.3 {3.50}	4.8	165 {17}	5.4	185 {19}	6.0	206 {21}	SWL 12− 15	
		20	25.7 {2.63}	6.4		7.2		8.0		20	
		25	20.6 {2.10}	8.0		9.0		10.0		25	
		30	17.2 {1.75}	9.6		10.8		12.0		30	
		35	14.7 {1.50}	11.2		12.6		14.0		35	
		40	12.9 {1.31}	12.8		14.4		16.0		40	
		45	11.4 {1.17}	14.4		16.2		18.0		45	
		50	10.3 {1.05}	16.0		18.0		20.0		50	
		55	9.4 {0.95}	17.6		19.8		22.0		55	
		60	8.6 {0.88}	19.2		21.6		24.0		60	
		65	7.9 {0.81}	20.8		23.4		26.0		65	
		70	7.4 {0.75}	22.4		25.2		28.0		70	
		75	6.9 {0.70}	24.0		27.0		30.0		75	
		80	6.4 {0.66}	25.6		28.8		32.0		80	
		90	5.7 {0.58}	28.8		32.4		36.0		90	
14	7	20	34.3 {3.50}	6.4	220 {22}	7.2	247 {25}	8.0	275 {28}	SWL 14− 20	
		25	27.5 {2.80}	8.0		9.0		10.0		25	
		30	22.9 {2.33}	9.6		10.8		12.0		30	
		35	19.6 {2.00}	11.2		12.6		14.0		35	
		40	17.2 {1.75}	12.8		14.4		16.0		40	
		45	15.3 {1.56}	14.4		16.2		18.0		45	
		50	13.7 {1.40}	16.0		18.0		20.0		50	
		55	12.5 {1.27}	17.6		19.8		22.0		55	
		60	11.4 {1.17}	19.2		21.6		24.0		60	
		65	10.6 {1.08}	20.8		23.4		26.0		65	
		70	9.8 {1.00}	22.4		25.2		28.0		70	
		75	9.2 {0.93}	24.0		27.0		30.0		75	
		80	8.6 {0.88}	25.6		28.8		32.0		80	
		90	7.6 {0.78}	28.8		32.4		36.0		90	
		100	6.9 {0.70}	32.0		36.0		40.0		100	
Operation frequency				One million times		500,000 times		300,000 times			

M Equivalent of SWOSC—V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

D	d	L	Spring constant N/mm{kgf/mm}	F=L×32% Fmm	F=L×32% Load N{kgf}	F=L×36% Fmm	F=L×36% Load N{kgf}	F=L×40% Fmm	F=L×40% Load N{kgf}	Part Number Type D−L	U/Price 1~19
16	8	20	42.9 {4.38}	6.4	275 {28}	7.2	309 {32}	8.0	343 {35}	SWL 16− 20	
		25	34.3 {3.50}	8.0		9.0		10.0		25	
		30	28.6 {2.92}	9.6		10.8		12.0		30	
		35	24.5 {2.50}	11.2		12.6		14.0		35	
		40	21.5 {2.19}	12.8		14.4		16.0		40	
		45	19.1 {1.94}	14.4		16.2		18.0		45	
		50	17.2 {1.75}	16.0		18.0		20.0		50	
		55	15.6 {1.59}	17.6		19.8		22.0		55	
		60	14.3 {1.46}	19.2		21.6		24.0		60	
		65	13.2 {1.35}	20.8		23.4		26.0		65	
		70	12.3 {1.25}	22.4		25.2		28.0		70	
		75	11.4 {1.17}	24.0		27.0		30.0		75	
		80	10.7 {1.09}	25.6		28.8		32.0		80	
		90	9.5 {0.97}	28.8		32.4		36.0		90	
		100	8.6 {0.88}	32.0		36.0		40.0		100	
		125	6.9 {0.70}	40.0		45.0		50.0		125	
18	9	20	52.7 {5.38}	6.4	337 {34}	7.2	380 {39}	8.0	422 {43}	SWL 18− 20	
		25	42.2 {4.30}	8.0		9.0		10.0		25	
		30	35.1 {3.58}	9.6		10.8		12.0		30	
		35	30.1 {3.07}	11.2		12.6		14.0		35	
		40	26.4 {2.69}	12.8		14.4		16.0		40	
		45	23.4 {2.39}	14.4		16.2		18.0		45	
		50	21.1 {2.15}	16.0		18.0		20.0		50	
		55	19.2 {1.95}	17.6		19.8		22.0		55	
		60	17.6 {1.79}	19.2		21.6		24.0		60	
		65	16.2 {1.65}	20.8		23.4		26.0		65	
		70	15.1 {1.54}	22.4		25.2		28.0		70	
		75	14.1 {1.43}	24.0		27.0		30.0		75	
		80	13.2 {1.34}	25.6		28.8		32.0		80	
		90	11.7 {1.19}	28.8		32.4		36.0		90	Quotation
		100	10.5 {1.08}	32.0		36.0		40.0		100	
		125	8.4 {0.86}	40.0		45.0		50.0		125	
20	10	20	66.2 {6.75}	6.4	424 {43}	7.2	477 {48}	8.0	530 {54}	SWL 20− 20	
		25	53.0 {5.40}	8.0		9.0		10.0		25	
		30	44.1 {4.50}	9.6		10.8		12.0		30	
		35	37.8 {3.86}	11.2		12.6		14.0		35	
		40	33.1 {3.38}	12.8		14.4		16.0		40	
		45	29.4 {3.00}	14.4		16.2		18.0		45	
		50	26.5 {2.70}	16.0		18.0		20.0		50	
		55	24.1 {2.45}	17.6		19.8		22.0		55	
		60	22.1 {2.25}	19.2		21.6		24.0		60	
		65	20.4 {2.08}	20.8		23.4		26.0		65	
		70	18.9 {1.93}	22.4		25.2		28.0		70	
		75	17.7 {1.80}	24.0		27.0		30.0		75	
		80	16.5 {1.69}	25.6		28.8		32.0		80	
		90	14.7 {1.50}	28.8		32.4		36.0		90	
		100	13.2 {1.35}	32.0		36.0		40.0		100	
		125	10.6 {1.08}	40.0		45.0		50.0		125	
		150	8.8 {0.90}	48.0		54.0		60.0		150	
22	11	25	65.7 {6.70}	8.0	526 {54}	9.0	591 {60}	10.0	657 {67}	SWL 22− 25	
		30	54.8 {5.58}	9.6		10.8		12.0		30	
		35	46.9 {4.79}	11.2		12.6		14.0		35	
		40	41.1 {4.19}	12.8		14.4		16.0		40	
		45	36.5 {3.72}	14.4		16.2		18.0		45	
		50	32.9 {3.35}	16.0		18.0		20.0		50	
		55	29.9 {3.05}	17.6		19.8		22.0		55	
		60	27.4 {2.79}	19.2		21.6		24.0		60	
		65	25.3 {2.58}	20.8		23.4		26.0		65	
		70	23.5 {2.39}	22.4		25.2		28.0		70	
		75	21.9 {2.23}	24.0		27.0		30.0		75	
		80	20.5 {2.09}	25.6		28.8		32.0		80	
		90	18.3 {1.86}	28.8		32.4		36.0		90	
		100	16.4 {1.68}	32.0		36.0		40.0		100	
		125	13.1 {1.34}	40.0		45.0		50.0		125	
		150	11.0 {1.12}	48.0		54.0		60.0		150	
Operation frequency				One million times		500,000 times		300,000 times			

Order **Part Number**
SWL22—100

Days to Ship **Quotation**

Price **Quotation**

D	d	L	Spring constant N/mm{kgf/mm}	F=L×32% Fmm	F=L×32% Load N{kgf}	F=L×36% Fmm	F=L×36% Load N{kgf}	F=L×40% Fmm	F=L×40% Load N{kgf}	Part Number Type D−L	U/Price 1~19
25	12.5	25	82.4{ 8.40}	8.0	659 {67}	9.0	741 {76}	10.0	824 {84}	SWL 25− 25	
		30	68.6{ 7.00}	9.6		10.8		12.0		30	
		35	58.8{ 6.00}	11.2		12.6		14.0		35	
		40	51.5{ 5.25}	12.8		14.4		16.0		40	
		45	45.8{ 4.67}	14.4		16.2		18.0		45	
		50	41.2{ 4.20}	16.0		18.0		20.0		50	
		55	37.4{ 3.82}	17.6		19.8		22.0		55	
		60	34.3{ 3.50}	19.2		21.6		24.0		60	
		65	31.7{ 3.23}	20.8		23.4		26.0		65	
		70	29.4{ 3.00}	22.4		25.2		28.0		70	
		75	27.5{ 2.80}	24.0		27.0		30.0		75	
		80	25.7{ 2.63}	25.6		28.8		32.0		80	
		90	22.9{ 2.33}	28.8		32.4		36.0		90	
		100	20.6{ 2.10}	32.0		36.0		40.0		100	
		125	16.5{ 1.68}	40.0		45.0		50.0		125	
		150	13.7{ 1.40}	48.0		54.0		60.0		150	
		175	11.8{ 1.20}	56.0		63.0		70.0		175	
		200	10.3{ 1.05}	64.0		72.0		80.0		200	
27	13.5	25	98.1{10.0 }	8.0	785 {80}	9.0	883 {90}	10.0	981 {100}	SWL 27− 25	
		30	81.7{ 8.33}	9.6		10.8		12.0		30	
		35	70.0{ 7.14}	11.2		12.6		14.0		35	
		40	61.3{ 6.25}	12.8		14.4		16.0		40	
		45	54.5{ 5.56}	14.4		16.2		18.0		45	
		50	49.0{ 5.00}	16.0		18.0		20.0		50	
		55	44.6{ 4.55}	17.6		19.8		22.0		55	
		60	40.9{ 4.17}	19.2		21.6		24.0		60	
		65	37.7{ 3.85}	20.8		23.4		26.0		65	
		70	35.0{ 3.57}	22.4		25.2		28.0		70	
		75	32.7{ 3.33}	24.0		27.0		30.0		75	
		80	30.6{ 3.13}	25.6		28.8		32.0		80	
		90	27.2{ 2.78}	28.8		32.4		36.0		90	
		100	24.5{ 2.50}	32.0		36.0		40.0		100	Quotation
		125	19.6{ 2.00}	40.0		45.0		50.0		125	
		150	16.3{ 1.67}	48.0		54.0		60.0		150	
		175	14.0{ 1.43}	56.0		63.0		70.0		175	
		200	12.3{ 1.25}	64.0		72.0		80.0		200	
30	15	25	119 {12.1 }	8.0	949 {97}	9.0	1067 {109}	10.0	1186 {121}	SWL 30− 25	
		30	98.8{10.1 }	9.6		10.8		12.0		30	
		35	84.7{ 8.64}	11.2		12.6		14.0		35	
		40	74.1{ 7.56}	12.8		14.4		16.0		40	
		45	65.9{ 6.72}	14.4		16.2		18.0		45	
		50	59.3{ 6.05}	16.0		18.0		20.0		50	
		55	53.9{ 5.50}	17.6		19.8		22.0		55	
		60	49.4{ 5.04}	19.2		21.6		24.0		60	
		65	45.6{ 4.65}	20.8		23.4		26.0		65	
		70	42.4{ 4.32}	22.4		25.2		28.0		70	
		75	39.5{ 4.03}	24.0		27.0		30.0		75	
		80	37.1{ 3.78}	25.6		28.8		32.0		80	
		90	32.9{ 3.36}	28.8		32.4		36.0		90	
		100	29.7{ 3.02}	32.0		36.0		40.0		100	
		125	23.7{ 2.42}	40.0		45.0		50.0		125	
		150	19.8{ 2.02}	48.0		54.0		60.0		150	
		175	16.9{ 1.73}	56.0		63.0		70.0		175	
		200	14.8{ 1.51}	64.0		72.0		80.0		200	
35	17.5	40	101 {10.3 }	12.8	1294 {132}	14.4	1455 {148}	16.0	1617 {165}	SWL 35− 40	
		45	89.8{ 9.16}	14.4		16.2		18.0		45	
		50	80.9{ 8.24}	16.0		18.0		20.0		50	
		55	73.5{ 7.49}	17.6		19.8		22.0		55	
		60	67.4{ 6.87}	19.2		21.6		24.0		60	
		65	62.2{ 6.34}	20.8		23.4		26.0		65	
		70	57.8{ 5.89}	22.4		25.2		28.0		70	
		75	53.9{ 5.50}	24.0		27.0		30.0		75	
		80	50.5{ 5.15}	25.6		28.8		32.0		80	
		90	44.9{ 4.58}	28.8		32.4		36.0		90	
		100	40.4{ 4.12}	32.0		36.0		40.0		100	
		125	32.3{ 3.30}	40.0		45.0		50.0		125	
		150	27.0{ 2.75}	48.0		54.0		60.0		150	
		175	23.1{ 2.36}	56.0		63.0		70.0		175	
		200	20.2{ 2.06}	64.0		72.0		80.0		200	
Operation frequency				One million times		500,000 times		300,000 times			

- Product guide P.1219
- Instructions and notes for coil springs P.1221
- Load deflection diagram P.1258

D	d	L	Spring constant N/mm{kgf/mm}	F=L×32% Fmm	F=L×32% Load N{kgf}	F=L×36% Fmm	F=L×36% Load N{kgf}	F=L×40% Fmm	F=L×40% Load N{kgf}	Part Number Type D−L	U/Price 1~19
40	20	40	132 {13.5 }	12.8	1694 {173}	14.4	1905 {194}	16.0	2117 {216}	SWL 40− 40	
		45	118 {12.0 }	14.4		16.2		18.0		45	
		50	106 {10.8 }	16.0		18.0		20.0		50	
		55	96.2{ 9.81}	17.6		19.8		22.0		55	
		60	88.2{ 8.99}	19.2		21.6		24.0		60	
		65	81.4{ 8.30}	20.8		23.4		26.0		65	
		70	75.6{ 7.71}	22.4		25.2		28.0		70	
		75	70.6{ 7.20}	24.0		27.0		30.0		75	
		80	66.2{ 6.75}	25.6		28.8		32.0		80	
		90	58.8{ 6.00}	28.8		32.4		36.0		90	
		100	52.9{ 5.40}	32.0		36.0		40.0		100	
		125	42.3{ 4.32}	40.0		45.0		50.0		125	
		150	35.3{ 3.60}	48.0		54.0		60.0		150	
		175	30.2{ 3.08}	56.0		63.0		70.0		175	
		200	26.5{ 2.70}	64.0		72.0		80.0		200	
		225	23.5{ 2.40}	72.0		81.0		90.0		225	
		250	21.2{ 2.16}	80.0		90.0		100.0		250	
		275	19.2{ 1.96}	88.0		99.0		110.0		275	
		300	17.6{ 1.80}	96.0		108.0		120.0		300	
50	25	50	166 {16.9 }	16.0	2650 {270}	18.0	2981 {304}	20.0	3312 {338}	SWL 50− 50	
		55	151 {15.4 }	17.6		19.8		22.0		55	
		60	138 {14.1 }	19.2		21.6		24.0		60	
		65	127 {13.0 }	20.8		23.4		26.0		65	
		70	118 {12.1 }	22.4		25.2		28.0		70	
		75	110 {11.3 }	24.0		27.0		30.0		75	
		80	104 {10.6 }	25.6		28.8		32.0		80	
		90	92.0{ 9.38}	28.8		32.4		36.0		90	
		100	82.8{ 8.44}	32.0		36.0		40.0		100	
		125	66.2{ 6.75}	40.0		45.0		50.0		125	
		150	55.2{ 5.63}	48.0		54.0		60.0		150	
		175	47.3{ 4.82}	56.0		63.0		70.0		175	
		200	41.4{ 4.22}	64.0		72.0		80.0		200	Quotation
		225	36.8{ 3.75}	72.0		81.0		90.0		225	
		250	33.1{ 3.38}	80.0		90.0		100.0		250	
		275	30.1{ 3.07}	88.0		99.0		110.0		275	
		300	27.6{ 2.81}	96.0		108.0		120.0		300	
		350	23.7{ 2.41}	112.0		126.0		140.0		350	
		400	20.7{ 2.11}	128.0		144.0		160.0		400	
		450	18.4{ 1.88}	144.0		162.0		180.0		450	
		500	16.6{ 1.69}	160.0		180.0		200.0		500	
60	30	60	199 {20.3 }	19.2	3816 {389}	21.6	4293 {438}	24.0	4770 {486}	SWL 60− 60	
		70	170 {17.4 }	22.4		25.2		28.0		70	
		80	149 {15.2 }	25.6		28.8		32.0		80	
		90	133 {13.5 }	28.8		32.4		36.0		90	
		100	119 {12.2 }	32.0		36.0		40.0		100	
		125	95.4{ 9.73}	40.0		45.0		50.0		125	
		150	79.5{ 8.11}	48.0		54.0		60.0		150	
		175	68.1{ 6.95}	56.0		63.0		70.0		175	
		200	59.6{ 6.08}	64.0		72.0		80.0		200	
		225	53.0{ 5.40}	72.0		81.0		90.0		225	
		250	47.7{ 4.86}	80.0		90.0		100.0		250	
		275	43.4{ 4.42}	88.0		99.0		110.0		275	
		300	39.8{ 4.05}	96.0		108.0		120.0		300	
		350	34.1{ 3.47}	112.0		126.0		140.0		350	
		400	29.8{ 3.04}	128.0		144.0		160.0		400	
		450	26.5{ 2.70}	144.0		162.0		180.0		450	
		500	23.9{ 2.43}	160.0		180.0		200.0		500	
70	38.5	70	214 {21.8 }	22.4	4782 {488}	25.2	5380 {549}	28.0	5978 {610}	SWL 70− 70	
		80	187 {19.0 }	25.6		28.8		32.0		80	
		90	166 {16.9 }	28.8		32.4		36.0		90	
		100	149 {15.2 }	32.0		36.0		40.0		100	
		125	120 {12.2 }	40.0		45.0		50.0		125	
		150	99.6{10.2 }	48.0		54.0		60.0		150	
		175	85.4{ 8.71}	56.0		63.0		70.0		175	
		200	74.7{ 7.62}	64.0		72.0		80.0		200	
		250	59.8{ 6.10}	80.0		90.0		100.0		250	
		300	49.8{ 5.08}	96.0		108.0		120.0		300	
		350	42.7{ 4.35}	112.0		126.0		140.0		350	
Operation frequency				One million times		500,000 times		300,000 times			

Alterations (NT) — **Part Number**
NT — SWL 30—90

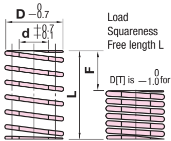
Quotation

Alteration	Code	Spec.	Details
No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

Springs

COIL SPRING

—MEDIUM LOAD SWM—



Load	±10%
Squareness	2° or less
Free length L	50 or less±0.5mm 55 or more±1%

RoHS

D[T] is $^{0}_{-1.0}$ for ϕ70.

Coil direction Right: Sectional drawing

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×25.6%		F=L×28.8%		F=L×32%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D–L	1~19
6	3	15	20.4{2.08}	3.8	79 {8.0}	4.3	88 {9.0}	4.8	98 {10}	SWM 6– 15	
		20	15.3{1.56}	5.1		5.8		6.4		20	
		25	12.3{1.25}	6.4		7.2		8.0		25	
		30	10.2{1.04}	7.7		8.6		9.6		30	
		35	8.8{0.89}	9.0		10.1		11.2		35	
		40	7.7{0.78}	10.2		11.5		12.8		40	
		45	6.8{0.69}	11.5		13.0		14.4		45	
		50	6.1{0.63}	12.8		14.4		16.0		50	
		55	5.6{0.57}	14.1		15.8		17.6		55	
		60	5.1{0.52}	15.4		17.3		19.2		60	
8	4	10	42.9{4.37}	2.6	110 {11}	2.9	123 {13}	3.2	137 {14}	SWM 8– 10	
		15	28.6{2.91}	3.8		4.3		4.8		15	
		20	21.5{2.18}	5.1		5.8		6.4		20	
		25	17.2{1.75}	6.4		7.2		8.0		25	
		30	14.3{1.46}	7.7		8.6		9.6		30	
		35	12.2{1.25}	9.0		10.1		11.2		35	
		40	10.7{1.09}	10.2		11.5		12.8		40	
		45	9.5{0.97}	11.5		13.0		14.4		45	
		50	8.6{0.87}	12.8		14.4		16.0		50	
		55	7.8{0.79}	14.1		15.8		17.6		55	
		60	7.1{0.73}	15.4		17.3		19.2		60	
		65	6.6{0.67}	16.6		18.7		20.8		65	
		70	6.1{0.62}	17.9		20.2		22.4		70	
		75	5.7{0.58}	19.2		21.6		24.0		75	
		80	5.4{0.55}	20.5		23.0		25.6		80	
10	5	10	61.3{6.25}	2.6	157 {16}	2.9	176 {18}	3.2	196 {20}	SWM 10– 10	
		15	40.9{4.17}	3.8		4.3		4.8		15	
		20	30.6{3.13}	5.1		5.8		6.4		20	
		25	24.5{2.50}	6.4		7.2		8.0		25	
		30	20.4{2.08}	7.7		8.6		9.6		30	
		35	17.5{1.79}	9.0		10.1		11.2		35	
		40	15.3{1.56}	10.2		11.5		12.8		40	
		45	13.6{1.39}	11.5		13.0		14.4		45	
		50	12.3{1.25}	12.8		14.4		16.0		50	Quotation
		55	11.1{1.14}	14.1		15.8		17.6		55	
		60	10.2{1.04}	15.4		17.3		19.2		60	
		65	9.4{0.96}	16.6		18.7		20.8		65	
		70	8.8{0.89}	17.9		20.2		22.4		70	
		75	8.2{0.83}	19.2		21.6		24.0		75	
		80	7.7{0.78}	20.5		23.0		25.6		80	
		90	6.8{0.69}	23.0		25.9		28.8		90	
12	6	15	59.2{6.04}	3.8	227 {23}	4.3	256 {26}	4.8	284 {29}	SWM 12– 15	
		20	44.4{4.53}	5.1		5.8		6.4		20	
		25	35.5{3.63}	6.4		7.2		8.0		25	
		30	29.6{3.02}	7.7		8.6		9.6		30	
		35	25.4{2.59}	9.0		10.1		11.2		35	
		40	22.2{2.27}	10.2		11.5		12.8		40	
		45	19.7{2.01}	11.5		13.0		14.4		45	
		50	17.8{1.81}	12.8		14.4		16.0		50	
		55	16.2{1.65}	14.1		15.8		17.6		55	
		60	14.8{1.51}	15.4		17.3		19.2		60	
		65	13.7{1.39}	16.6		18.7		20.8		65	
		70	12.7{1.29}	17.9		20.2		22.4		70	
		75	11.8{1.21}	19.2		21.6		24.0		75	
		80	11.1{1.13}	20.5		23.0		25.6		80	
		90	9.9{1.01}	23.0		25.9		28.8		90	
14	7	20	59.8{6.09}	5.1	306 {31}	5.8	345 {35}	6.4	383 {39}	SWM 14– 20	
		25	47.9{4.88}	6.4		7.2		8.0		25	
		30	39.9{4.08}	7.7		8.6		9.6		30	
		35	34.2{3.48}	9.0		10.1		11.2		35	
		40	29.9{3.05}	10.2		11.5		12.8		40	
		45	26.6{2.71}	11.5		13.0		14.4		45	
		50	23.9{2.44}	12.8		14.4		16.0		50	
		55	21.8{2.22}	14.1		15.8		17.6		55	
		60	19.9{2.03}	15.4		17.3		19.2		60	
		65	18.4{1.88}	16.6		18.7		20.8		65	
		70	17.1{1.74}	17.9		20.2		22.4		70	
		75	16.0{1.63}	19.2		21.6		24.0		75	
		80	15.0{1.52}	20.5		23.0		25.6		80	
		90	13.3{1.35}	23.0		25.9		28.8		90	
		100	12.0{1.22}	25.6		28.8		32.0		100	
Operation frequency				One million times		500,000 times		300,000 times			

D	d	L	Spring constant N/mm{kgf/mm}	F=L×25.6%		F=L×28.8%		F=L×32%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D–L	1~19
16	8	20	78.1{7.97}	5.1	400 {41}	5.8	450 {46}	6.4	500 {51}	SWM 16– 20	
		25	62.5{6.38}	6.4		7.2		8.0		25	
		30	52.1{5.31}	7.7		8.6		9.6		30	
		35	44.7{4.55}	9.0		10.1		11.2		35	
		40	39.1{3.98}	10.2		11.5		12.8		40	
		45	34.7{3.54}	11.5		13.0		14.4		45	
		50	31.3{3.19}	12.8		14.4		16.0		50	
		55	28.4{2.90}	14.1		15.8		17.6		55	
		60	26.0{2.66}	15.4		17.3		19.2		60	
		65	24.0{2.45}	16.6		18.7		20.8		65	
		70	22.3{2.28}	17.9		20.2		22.4		70	
		75	20.8{2.13}	19.2		21.6		24.0		75	
		80	19.5{1.99}	20.5		23.0		25.6		80	
		90	17.4{1.77}	23.0		25.9		28.8		90	
		100	15.6{1.59}	25.6		28.8		32.0		100	
18	9	20	99.6{10.2}	5.1	510 {52}	5.8	574 {59}	6.4	637 {65}	SWM 18– 20	
		25	79.7{8.13}	6.4		7.2		8.0		25	
		30	66.4{6.77}	7.7		8.6		9.6		30	
		35	56.9{5.80}	9.0		10.1		11.2		35	
		40	49.8{5.08}	10.2		11.5		12.8		40	
		45	44.3{4.51}	11.5		13.0		14.4		45	
		50	39.8{4.06}	12.8		14.4		16.0		50	
		55	36.2{3.69}	14.1		15.8		17.6		55	
		60	33.2{3.39}	15.4		17.3		19.2		60	
		65	30.6{3.13}	16.6		18.7		20.8		65	
		70	28.5{2.90}	17.9		20.2		22.4		70	
		75	26.6{2.71}	19.2		21.6		24.0		75	
		80	24.9{2.54}	20.5		23.0		25.6		80	
		90	22.1{2.26}	23.0		25.9		28.8		90	
		100	19.9{2.03}	25.6		28.8		32.0		100	Quotation
20	10	20	123{12.5}	5.1	628 {64}	5.8	706 {72}	6.4	784 {80}	SWM 20– 20	
		25	98.0{10.0}	6.4		7.2		8.0		25	
		30	81.7{8.33}	7.7		8.6		9.6		30	
		35	70.0{7.14}	9.0		10.1		11.2		35	
		40	61.3{6.25}	10.2		11.5		12.8		40	
		45	54.4{5.55}	11.5		13.0		14.4		45	
		50	49.0{5.00}	12.8		14.4		16.0		50	
		55	44.5{4.55}	14.1		15.8		17.6		55	
		60	40.8{4.17}	15.4		17.3		19.2		60	
		65	37.7{3.85}	16.6		18.7		20.8		65	
		70	35.0{3.57}	17.9		20.2		22.4		70	
		75	32.7{3.33}	19.2		21.6		24.0		75	
		80	30.6{3.13}	20.5		23.0		25.6		80	
		90	27.2{2.78}	23.0		25.9		28.8		90	
		100	24.5{2.50}	25.6		28.8		32.0		100	
		125	19.6{2.00}	32.0		36.0		40.0		125	
		150	16.3{1.67}	38.4		43.2		48.0		150	
22	11	25	119{12.1}	6.4	761 {78}	7.2	856 {87}	8.0	951 {97}	SWM 22– 25	
		30	99.1{10.1}	7.7		8.6		9.6		30	
		35	84.9{8.66}	9.0		10.1		11.2		35	
		40	74.3{7.58}	10.2		11.5		12.8		40	
		45	66.1{6.74}	11.5		13.0		14.4		45	
		50	59.5{6.06}	12.8		14.4		16.0		50	
		55	54.0{5.51}	14.1		15.8		17.6		55	
		60	49.5{5.05}	15.4		17.3		19.2		60	
		65	45.7{4.66}	16.6		18.7		20.8		65	
		70	42.5{4.33}	17.9		20.2		22.4		70	
		75	39.6{4.04}	19.2		21.6		24.0		75	
		80	37.2{3.79}	20.5		23.0		25.6		80	
		90	33.0{3.37}	23.0		25.9		28.8		90	
		100	29.7{3.03}	25.6		28.8		32.0		100	
		125	23.8{2.43}	32.0		36.0		40.0		125	
		150	19.8{2.02}	38.4		43.2		48.0		150	
Operation frequency				One million times		500,000 times		300,000 times			

Order **Part Number**
SWM20—80

Days to Ship Quotation

Price Quotation

D	d	L	Spring constant N/mm{kgf/mm}	F=L×25.6%		F=L×28.8%		F=L×32%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D–L	1~19
25	12.5	25	153{15.6}	6.4	981 {100}	7.2	1103 {113}	8.0	1225 {125}	SWM 25– 25	
		30	128{13.0}	7.7		8.6		9.6		30	
		35	109{11.2}	9.0		10.1		11.2		35	
		40	95.7{9.77}	10.2		11.5		12.8		40	
		45	85.1{8.68}	11.5		13.0		14.4		45	
		50	76.6{7.81}	12.8		14.4		16.0		50	
		55	69.6{7.10}	14.1		15.8		17.6		55	
		60	63.8{6.51}	15.4		17.3		19.2		60	
		65	58.9{6.01}	16.6		18.7		20.8		65	
		70	54.7{5.58}	17.9		20.2		22.4		70	
		75	51.0{5.21}	19.2		21.6		24.0		75	
		80	47.9{4.88}	20.5		23.0		25.6		80	
		90	42.5{4.34}	23.0		25.9		28.8		90	
		100	38.3{3.91}	25.6		28.8		32.0		100	
		125	30.6{3.13}	32.0		36.0		40.0		125	
		150	25.5{2.60}	38.4		43.2		48.0		150	
		175	21.9{2.23}	44.8		50.4		56.0		175	
27	13.5	25	179{18.3}	6.4	1145 {117}	7.2	1288 {131}	8.0	1431 {146}	SWM 27– 25	
		30	149{15.2}	7.7		8.6		9.6		30	
		35	128{13.0}	9.0		10.1		11.2		35	
		40	112{11.4}	10.2		11.5		12.8		40	
		45	99.4{10.1}	11.5		13.0		14.4		45	
		50	89.4{9.13}	12.8		14.4		16.0		50	
		55	81.3{8.30}	14.1		15.8		17.6		55	
		60	74.5{7.60}	15.4		17.3		19.2		60	
		65	68.8{7.02}	16.6		18.7		20.8		65	
		70	63.9{6.52}	17.9		20.2		22.4		70	
		75	59.6{6.08}	19.2		21.6		24.0		75	
		80	55.9{5.70}	20.5		23.0		25.6		80	
		90	49.7{5.07}	23.0		25.9		28.8		90	
		100	44.7{4.56}	25.6		28.8		32.0		100	Quotation
		125	35.8{3.65}	32.0		36.0		40.0		125	
		150	29.8{3.04}	38.4		43.2		48.0		150	
		175	25.6{2.61}	44.8		50.4		56.0		175	
30	15	25	221{22.5}	6.4	1412 {144}	7.2	1589 {162}	8.0	1765 {180}	SWM 30– 25	
		30	184{18.8}	7.7		8.6		9.6		30	
		35	158{16.1}	9.0		10.1		11.2		35	
		40	138{14.1}	10.2		11.5		12.8		40	
		45	123{12.5}	11.5		13.0		14.4		45	
		50	110{11.3}	12.8		14.4		16.0		50	
		55	100{10.2}	14.1		15.8		17.6		55	
		60	91.9{9.38}	15.4		17.3		19.2		60	
		65	84.9{8.65}	16.6		18.7		20.8		65	
		70	78.8{8.04}	17.9		20.2		22.4		70	
		75	73.5{7.50}	19.2		21.6		24.0		75	
		80	69.0{7.03}	20.5		23.0		25.6		80	
		90	61.3{6.25}	23.0		25.9		28.8		90	
		100	55.2{5.63}	25.6		28.8		32.0		100	
		125	44.1{4.50}	32.0		36.0		40.0		125	
		150	36.8{3.75}	38.4		43.2		48.0		150	
		175	31.5{3.21}	44.8		50.4		56.0		175	
		200	27.6{2.81}	51.2		57.6		64.0		200	
35	17.5	40	188{19.1}	10.2	1921 {196}	11.5	2161 {220}	12.8	2401 {245}	SWM 35– 40	
		45	167{17.0}	11.5		12.9		14.4		45	
		50	150{15.3}	12.8		14.4		16.0		50	
		55	136{13.9}	14.1		15.8		17.6		55	
		60	125{12.8}	15.4		17.3		19.2		60	
		65	115{11.8}	16.6		18.7		20.8		65	
		70	107{10.9}	17.9		20.2		22.4		70	
		75	100{10.2}	19.2		21.6		24.0		75	
		80	93.8{9.57}	20.5		23.0		25.6		80	
		90	83.4{8.51}	23.0		25.9		28.8		90	
		100	75.0{7.66}	25.6		28.8		32.0		100	
		125	60.0{6.13}	32.0		36.0		40.0		125	
		150	50.0{5.10}	38.4		43.2		48.0		150	
		175	42.9{4.38}	44.8		50.4		56.0		175	
		200	37.5{3.83}	51.2		57.6		64.0		200	
Operation frequency				One million times		500,000 times		300,000 times			

M Equivalent of SWOSC—V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

Product guide P.1219 Load deflection diagram P.1258
Instructions and notes for coil springs P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×25.6%		F=L×28.8%		F=L×32%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D–L	1~19
40	20	40	245{25.0}	10.2	2510 {256}	11.5	2824 {288}	12.8	3138 {320}	SWM 40– 40	
		45	218{22.2}	11.5		13.0		14.4		45	
		50	196{20.0}	12.8		14.4		16.0		50	
		55	178{18.2}	14.1		15.8		17.6		55	
		60	163{16.7}	15.4		17.3		19.2		60	
		65	151{15.4}	16.6		18.7		20.8		65	
		70	140{14.3}	17.9		20.2		22.4		70	
		75	131{13.3}	19.2		21.6		24.0		75	
		80	123{12.5}	20.5		23.0		25.6		80	
		90	109{11.1}	23.0		25.9		28.8		90	
		100	98.1{10.0}	25.6		28.8		32.0		100	
		125	78.5{8.00}	32.0		36.0		40.0		125	
		150	65.4{6.67}	38.4		43.2		48.0		150	
		175	56.0{5.71}	44.8		50.4		56.0		175	
		200	49.0{5.00}	51.2		57.6		64.0		200	
		225	43.6{4.44}	57.6		64.8		72.0		225	
		250	39.2{4.00}	64.0		72.0		80.0		250	
		275	35.7{3.64}	70.4		79.2		88.0		275	
		300	32.7{3.33}	76.8		86.4		96.0		300	
50	25	50	306{31.2}	12.8	3920 {400}	14.4	4410 {450}	16.0	4900 {500}	SWM 50– 50	
		55	278{28.4}	14.1		15.8		17.6		55	
		60	255{26.0}	15.4		17.3		19.2		60	
		65	236{24.0}	16.6		18.7		20.8		65	
		70	219{22.3}	17.9		20.2		22.4		70	
		75	204{20.8}	19.2		21.6		24.0		75	
		80	191{19.5}	20.5		23.0		25.6		80	
		90	170{17.3}	23.0		25.9		28.8		90	
		100	153{15.6}	25.6		28.8		32.0		100	
		125	123{12.5}	32.0		36.0		40.0		125	Quotation
		150	102{10.4}	38.4		43.2		48.0		150	
		175	87.5{8.92}	44.8		50.4		56.0		175	
		200	76.6{7.81}	51.2		57.6		64.0		200	
		225	68.1{6.94}	57.6		64.8		72.0		225	
		250	61.3{6.25}	64.0		72.0		80.0		250	
		275	55.7{5.68}	70.4		79.2		88.0		275	
		300	51.0{5.20}	76.8		86.4		96.0		300	
		350	43.8{4.46}	89.6		100.8		112.0		350	
60	30	60	368{37.5}	15.4	5645 {576}	17.3	6350 {648}	19.2	7056 {720}	SWM 60– 60	
		70	315{32.1}	17.9		20.2		22.4		70	
		80	276{28.1}	20.5		23.0		25.6		80	
		90	245{25.0}	23.0		25.9		28.8		90	
		100	221{22.5}	25.6		28.8		32.0		100	
		125	176{18.0}	32.0		36.0		40.0		125	
		150	147{15.0}	38.4		43.2		48.0		150	
		175	126{12.8}	44.8		50.4		56.0		175	
		200	110{11.2}	51.2		57.6		64.0		200	
		225	98.0{10.0}	57.6		64.8		72.0		225	
		250	88.2{8.99}	64.0		72.0		80.0		250	
		275	80.2{8.18}	70.4		79.2		88.0		275	
		300	73.5{7.49}	76.8		86.4		96.0		300	
		350	63.0{6.42}	89.6		100.8		112.0		350	
70	38.5	70	372{37.9}	17.9	6664 {680}	20.2	7497 {764}	22.4	8330 {850}	SWM 70– 70	
		80	325{33.2}	20.5		23.0		25.6		80	
		90	289{29.5}	23.0		25.9		28.8		90	
		100	260{26.5}	25.6		28.8		32.0		100	
		125	208{21.2}	32.0		36.0		40.0		125	
		150	174{17.7}	38.4		43.2		48.0		150	
		175	149{15.2}	44.8		50.4		56.0		175	
		200	130{13.3}	51.2		57.6		64.0		200	
		250	104{10.6}	64.0		72.0		80.0		250	
		300	86.8{8.85}	76.8		86.4		96.0		300	
		350	74.4{7.58}	89.6		100.8		112.0		350	
Operation frequency				One million times		500,000 times		300,000 times			

Alterations

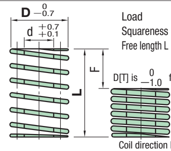
(NT) — **Part Number**
NT — SWM 30—40

Quotation

Alteration	Code	Spec.	Details
No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

COIL SPRING

—HEAVY LOAD　SWH—



RoHS

Load	±10%
Squareness	2° or less
Free length L	50 or less±0.5mm 55 or more±1%

D[T] is $^{0}_{-1.0}$ for ϕ70.

Coil direction Right: :Sectional drawing

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×19.2%		F=L×21.6%		F=L×24%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
6	3	15	38.1{3.9}	2.9	110{11}	3.2	123{13}	3.6	137{14}	SWH 6−15	
		20	28.5{2.9}	3.8		4.3		4.8		20	
		25	22.8{2.3}	4.8		5.4		6.0		25	
		30	19.0{1.9}	5.8		6.5		7.2		30	
		35	16.3{1.7}	6.7		7.6		8.4		35	
		40	14.3{1.5}	7.7		8.6		9.6		40	
		45	12.7{1.3}	8.6		9.7		10.8		45	
		50	11.4{1.2}	9.6		10.8		12.0		50	
		55	10.4{1.1}	10.6		11.9		13.2		55	
		60	9.5{1.0}	11.5		13.0		14.4		60	
8	4	10	85.8{8.8}	1.9	165{17}	2.2	185{19}	2.4	206{21}	SWH 8−10	
		15	57.2{5.8}	2.9		3.2		3.6		15	
		20	42.9{4.4}	3.8		4.3		4.8		20	
		25	34.3{3.5}	4.8		5.4		6.0		25	
		30	28.6{2.9}	5.8		6.5		7.2		30	
		35	24.5{2.5}	6.7		7.5		8.4		35	
		40	21.5{2.2}	7.7		8.6		9.6		40	
		45	19.1{1.9}	8.6		9.7		10.8		45	
		50	17.2{1.8}	9.6		10.8		12.0		50	
		55	15.6{1.6}	10.6		11.8		13.2		55	
		60	14.3{1.5}	11.5		13.0		14.4		60	
		65	13.2{1.3}	12.5		14.0		15.6		65	
		70	12.3{1.3}	13.4		15.1		16.8		70	
		75	11.4{1.2}	14.4		16.2		18.0		75	
		80	10.7{1.1}	15.4		17.3		19.2		80	
10	5	10	123{12.5}	1.9	235{24}	2.2	265{27}	2.4	294{30}	SWH 10−10	
		15	81.7{8.3}	2.9		3.2		3.6		15	
		20	61.3{6.3}	3.8		4.3		4.8		20	
		25	49.0{5.0}	4.8		5.4		6.0		25	
		30	40.8{4.2}	5.8		6.5		7.2		30	
		35	35.0{3.6}	6.7		7.5		8.4		35	
		40	30.6{3.1}	7.7		8.6		9.6		40	
		45	27.2{2.8}	8.6		9.7		10.8		45	Quotation
		50	24.5{2.5}	9.6		10.8		12.0		50	
		55	22.3{2.3}	10.6		11.8		13.2		55	
		60	20.4{2.1}	11.5		13.0		14.4		60	
		65	18.8{1.9}	12.5		14.0		15.6		65	
		70	17.5{1.8}	13.4		15.1		16.8		70	
		75	16.3{1.7}	14.4		16.2		18.0		75	
		80	15.3{1.6}	15.4		17.3		19.2		80	
		90	13.6{1.4}	17.3		19.4		21.6		90	
12	6	15	117{11.9}	2.9	337{34}	3.2	379{38}	3.6	421{43}	SWH 12−15	
		20	87.7{8.9}	3.8		4.3		4.8		20	
		25	70.2{7.2}	4.8		5.4		6.0		25	
		30	58.5{6.0}	5.8		6.5		7.2		30	
		35	50.1{5.1}	6.7		7.5		8.4		35	
		40	43.9{4.5}	7.7		8.6		9.6		40	
		45	39.0{4.0}	8.6		9.7		10.8		45	
		50	35.1{3.6}	9.6		10.8		12.0		50	
		55	31.9{3.3}	10.6		11.8		13.2		55	
		60	29.2{3.0}	11.5		13.0		14.4		60	
		65	27.0{2.8}	12.5		14.0		15.6		65	
		70	25.1{2.6}	13.4		15.1		16.8		70	
		75	23.4{2.4}	14.4		16.2		18.0		75	
		80	21.9{2.2}	15.4		17.3		19.2		80	
		90	19.5{2.0}	17.3		19.4		21.6		90	
14	7	20	120{12.3}	3.8	462{47}	4.3	520{53}	4.8	578{59}	SWH 14−20	
		25	96.3{9.8}	4.8		5.4		6.0		25	
		30	80.3{8.2}	5.8		6.5		7.2		30	
		35	68.8{7.0}	6.7		7.5		8.4		35	
		40	60.2{6.1}	7.7		8.6		9.6		40	
		45	53.5{5.5}	8.6		9.7		10.8		45	
		50	48.2{4.9}	9.6		10.8		12.0		50	
		55	43.8{4.5}	10.6		11.8		13.2		55	
		60	40.1{4.1}	11.5		13.0		14.4		60	
		65	37.1{3.8}	12.5		14.0		15.6		65	
		70	34.4{3.5}	13.4		15.1		16.8		70	
		75	32.1{3.3}	14.4		16.2		18.0		75	
		80	30.1{3.1}	15.4		17.3		19.2		80	
		90	26.8{2.7}	17.3		19.4		21.6		90	
		100	24.1{2.5}	19.2		21.6		24.0		100	
16	8	20	157{16.0}	3.8	604{62}	4.3	680{69}	4.8	755{77}	SWH 16−20	
		25	126{12.8}	4.8		5.4		6.0		25	
		30	105{10.7}	5.8		6.5		7.2		30	
		35	89.9{9.2}	6.7		7.5		8.4		35	
		40	78.6{8.0}	7.7		8.6		9.6		40	
		45	69.9{7.1}	8.6		9.7		10.8		45	
		50	62.9{6.4}	9.6		10.8		12.0		50	
		55	57.2{5.8}	10.6		11.8		13.2		55	
		60	52.4{5.3}	11.5		13.0		14.4		60	
		65	48.4{4.9}	12.5		14.0		15.6		65	
		70	44.9{4.6}	13.4		15.1		16.8		70	
		75	41.9{4.3}	14.4		16.2		18.0		75	
		80	39.3{4.0}	15.4		17.3		19.2		80	
		90	35.0{3.6}	17.3		19.4		21.6		90	
		100	31.5{3.2}	19.2		21.6		24.0		100	
18	9	20	198{20.2}	3.8	761{78}	4.3	856{87}	4.8	951{97}	SWH 18−20	
		25	159{16.2}	4.8		5.4		6.0		25	
		30	132{13.5}	5.8		6.5		7.2		30	
		35	113{11.5}	6.7		7.5		8.4		35	
		40	99.1{10.1}	7.7		8.6		9.6		40	
		45	88.1{9.0}	8.6		9.7		10.8		45	
		50	79.3{8.1}	9.6		10.8		12.0		50	
		55	72.0{7.3}	10.6		11.8		13.2		55	
		60	66.0{6.7}	11.5		13.0		14.4		60	
		65	61.0{6.2}	12.5		14.0		15.6		65	
		70	56.6{5.8}	13.4		15.1		16.8		70	
		75	52.8{5.4}	14.4		16.2		18.0		75	
		80	49.5{5.1}	15.4		17.3		19.2		80	
		90	44.0{4.5}	17.3		19.4		21.6		90	
		100	39.6{4.0}	19.2		21.6		24.0		100	Quotation
20	10	20	245{25.0}	3.8	941{96}	4.3	1058{108}	4.8	1176{120}	SWH 20−20	
		25	196{20.0}	4.8		5.4		6.0		25	
		30	163{16.7}	5.8		6.5		7.2		30	
		35	140{14.3}	6.7		7.5		8.4		35	
		40	123{12.5}	7.7		8.6		9.6		40	
		45	109{11.1}	8.6		9.7		10.8		45	
		50	98.0{10.0}	9.6		10.8		12.0		50	
		55	89.1{9.1}	10.6		11.8		13.2		55	
		60	81.7{8.3}	11.5		13.0		14.4		60	
		65	75.4{7.7}	12.5		14.0		15.6		65	
		70	70.0{7.1}	13.4		15.1		16.8		70	
		75	65.3{6.7}	14.4		16.2		18.0		75	
		80	61.3{6.2}	15.4		17.3		19.2		80	
		90	54.4{5.6}	17.3		19.4		21.6		90	
		100	49.0{5.0}	19.2		21.6		24.0		100	
		125	39.2{4.0}	24.0		27.0		30.0		125	
		150	32.7{3.3}	28.8		32.4		36.0		150	
22	11	25	237{24.2}	4.8	1137{116}	5.4	1279{130}	6.0	1421{145}	SWH 22−25	
		30	197{20.1}	5.8		6.5		7.2		30	
		35	169{17.3}	6.7		7.6		8.4		35	
		40	148{15.1}	7.7		8.6		9.6		40	
		45	132{13.4}	8.6		9.7		10.8		45	
		50	118{12.1}	9.6		10.8		12.0		50	
		55	108{11.0}	10.6		11.9		13.2		55	
		60	98.7{10.1}	11.5		13.0		14.4		60	
		65	91.1{9.3}	12.5		14.0		15.6		65	
		70	84.6{8.6}	13.4		15.1		16.8		70	
		75	78.9{8.1}	14.4		16.2		18.0		75	
		80	74.0{7.5}	15.4		17.3		19.2		80	
		90	65.8{6.7}	17.3		19.4		21.6		90	
		100	59.2{6.0}	19.2		21.6		24.0		100	
		125	47.4{4.8}	24.0		27.0		30.0		125	
		150	39.5{4.0}	28.8		32.4		36.0		150	
25	12.5	25	306{31.2}	4.8	1466{150}	5.4	1650{168}	6.0	1833{187}	SWH 25−25	
		30	255{26.0}	5.8		6.5		7.2		30	
		35	218{22.3}	6.7		7.6		8.4		35	
		40	191{19.5}	7.7		8.6		9.6		40	
		45	170{17.3}	8.6		9.7		10.8		45	
		50	153{15.6}	9.6		10.8		12.0		50	
		55	139{14.2}	10.6		11.9		13.2		55	
		60	127{13.0}	11.5		13.0		14.4		60	
		65	118{12.0}	12.5		14.0		15.6		65	
		70	109{11.1}	13.4		15.1		16.8		70	
		75	102{10.4}	14.4		16.2		18.0		75	
		80	95.5{9.7}	15.4		17.3		19.2		80	
		90	84.9{8.7}	17.3		19.4		21.6		90	
		100	76.4{7.8}	19.2		21.6		24.0		100	
		125	61.1{6.2}	24.0		27.0		30.0		125	
		150	50.9{5.2}	28.8		32.4		36.0		150	
		175	43.6{4.5}	33.6		37.8		42.0		175	
27	13.5	25	358{36.5}	4.8	1717{175}	5.4	1931{197}	6.0	2146{219}	SWH 27−25	
		30	298{30.4}	5.8		6.5		7.2		30	
		35	255{26.1}	6.7		7.6		8.4		35	
		40	224{22.8}	7.7		8.6		9.6		40	
		45	199{20.3}	8.6		9.7		10.8		45	
		50	179{18.2}	9.6		10.8		12.0		50	
		55	163{16.6}	10.6		11.9		13.2		55	
		60	149{15.2}	11.5		13.0		14.4		60	
		65	138{14.0}	12.5		14.0		15.6		65	
		70	128{13.0}	13.4		15.1		16.8		70	
		75	119{12.2}	14.4		16.2		18.0		75	
		80	112{11.4}	15.4		17.3		19.2		80	
		90	99.4{10.1}	17.3		19.4		21.6		90	
		100	89.4{9.1}	19.2		21.6		24.0		100	
		125	71.5{7.3}	24.0		27.0		30.0		125	Quotation
		150	59.6{6.1}	28.8		32.4		36.0		150	
		175	51.1{5.2}	33.6		37.8		42.0		175	
30	15	25	441{45.0}	4.8	2117{216}	5.4	2381{243}	6.0	2646{270}	SWH 30−25	
		30	368{37.5}	5.8		6.5		7.2		30	
		35	315{32.1}	6.7		7.6		8.4		35	
		40	276{28.1}	7.7		8.6		9.6		40	
		45	245{25.0}	8.6		9.7		10.8		45	
		50	221{22.5}	9.6		10.8		12.0		50	
		55	200{20.4}	10.6		11.9		13.2		55	
		60	184{18.7}	11.5		13.0		14.4		60	
		65	170{17.3}	12.5		14.0		15.6		65	
		70	158{16.1}	13.4		15.1		16.8		70	
		75	147{15.0}	14.4		16.2		18.0		75	
		80	138{14.1}	15.4		17.3		19.2		80	
		90	123{12.5}	17.3		19.4		21.6		90	
		100	110{11.2}	19.2		21.6		24.0		100	
		125	88.2{9.0}	24.0		27.0		30.0		125	
		150	73.5{7.5}	28.8		32.4		36.0		150	
		175	63.0{6.4}	33.6		37.8		42.0		175	
		200	55.1{5.6}	38.4		43.2		48.0		200	
35	17.5	40	375{38.2}	7.7	2878{293}	8.6	3237{330}	9.6	3597{367}	SWH 35−40	
		45	333{34.0}	8.6		9.7		10.8		45	
		50	300{30.6}	9.6		10.8		12.0		50	
		55	273{27.8}	10.6		11.9		13.2		55	
		60	250{25.5}	11.5		13.0		14.4		60	
		65	231{23.5}	12.5		14.0		15.6		65	
		70	214{21.8}	13.4		15.1		16.8		70	
		75	200{20.4}	14.4		16.2		18.0		75	
		80	187{19.1}	15.4		17.3		19.2		80	
		90	167{17.0}	17.3		19.4		21.6		90	
		100	150{15.3}	19.2		21.6		24.0		100	
		125	120{12.2}	24.0		27.0		30.0		125	
		150	99.9{10.2}	28.8		32.4		36.0		150	
		175	85.6{8.7}	33.6		37.8		42.0		175	
		200	74.9{7.6}	38.4		43.2		48.0		200	
40	20	40	490{50.0}	7.7	3763{384}	8.6	4234{432}	9.6	4704{480}	SWH 40−40	
		45	436{44.4}	8.6		9.7		10.8		45	
		50	392{40.0}	9.6		10.8		12.0		50	
		55	356{36.3}	10.6		11.9		13.2		55	
		60	327{33.3}	11.5		13.0		14.4		60	
		65	302{30.7}	12.5		14.0		15.6		65	
		70	280{28.6}	13.4		15.1		16.8		70	
		75	261{26.6}	14.4		16.2		18.0		75	
		80	245{25.0}	15.4		17.3		19.2		80	
		90	218{22.2}	17.3		19.4		21.6		90	
		100	196{20.0}	19.2		21.6		24.0		100	
		125	157{16.0}	24.0		27.0		30.0		125	
		150	131{13.3}	28.8		32.4		36.0		150	
		175	112{11.4}	33.6		37.8		42.0		175	
		200	98.0{10.0}	38.4		43.2		48.0		200	
		225	87.1{8.9}	43.2		48.6		54.0		225	
		250	78.4{8.0}	48.0		54.0		60.0		250	
		275	71.3{7.3}	52.8		59.4		66.0		275	
		300	65.3{6.7}	57.6		64.8		72.0		300	
50	25	50	613{62.5}	9.6	5880{600}	10.8	6615{675}	12.0	7350{750}	SWH 50−50	
		55	557{56.8}	10.6		11.9		13.2		55	
		60	510{52.0}	11.5		13.0		14.4		60	
		65	471{48.0}	12.5		14.0		15.6		65	
		70	438{44.6}	13.4		15.1		16.8		70	
		75	408{41.6}	14.4		16.2		18.0		75	
		80	383{39.0}	15.4		17.3		19.2		80	
		90	340{34.7}	17.3		19.4		21.6		90	
		100	306{31.2}	19.2		21.6		24.0		100	
		125	245{25.0}	24.0		27.0		30.0		125	Quotation
		150	204{20.8}	28.8		32.4		36.0		150	
		175	175{17.8}	33.6		37.8		42.0		175	
		200	153{15.6}	38.4		43.2		48.0		200	
		225	136{13.9}	43.2		48.6		54.0		225	
		250	123{12.5}	48.0		54.0		60.0		250	
		275	111{11.4}	52.8		59.4		66.0		275	
		300	102{10.4}	57.6		64.8		72.0		300	
		350	87.5{8.9}	67.2		75.6		84.0		350	
60	30	60	735{74.9}	11.5	8467{863}	13.0	9526{971}	14.4	10584{1079}	SWH 60−60	
		70	630{64.2}	13.4		15.1		16.8		70	
		80	551{56.2}	15.4		17.3		19.2		80	
		90	490{50.0}	17.3		19.4		21.6		90	
		100	441{45.0}	19.2		21.6		24.0		100	
		125	353{36.0}	24.0		27.0		30.0		125	
		150	294{30.0}	28.8		32.4		36.0		150	
		175	252{25.7}	33.6		37.8		42.0		175	
		200	221{22.5}	38.4		43.2		48.0		200	
		225	196{20.0}	43.2		48.6		54.0		225	
		250	176{18.0}	48.0		54.0		60.0		250	
		275	160{16.4}	52.8		59.4		66.0		275	
		300	147{15.0}	57.6		64.8		72.0		300	
		350	126{12.8}	67.2		75.6		84.0		350	
70	38.5	70	747{76.2}	13.4	10046{1024}	15.1	11301{1152}	16.8	12557{1280}	SWH 70−70	
		80	654{66.7}	15.4		17.3		19.2		80	
		90	581{59.3}	17.3		19.4		21.6		90	
		100	523{53.4}	19.2		21.6		24.0		100	
		125	419{42.7}	24.0		27.0		30.0		125	
		150	349{35.6}	28.8		32.4		36.0		150	
		175	299{30.5}	33.6		37.8		42.0		175	
		200	262{26.7}	38.4		43.2		48.0		200	
		250	209{21.3}	48.0		54.0		60.0		250	
		300	174{17.8}	57.6		64.8		72.0		300	
		350	149{15.2}	67.2		75.6		84.0		350	
Operation frequency				One million times		500,000 times		300,000 times			

Order	Part Number	SWH20−30
Days to Ship		Quotation
Price		Quotation

M Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load＝Spring constant×Deflection
(International unit) N＝N/mm×Fmm
kgf＝kgf/mm×Fmm
(kgf＝N×0.101972)

Product guide P.1219　Load deflection diagram P.1258

Instructions and notes for coil springs P.1221

Alterations

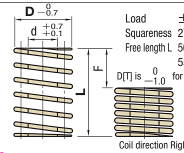
(NT) − Part Number
NT − SWH 30−50

Days to Ship: Quotation

Alteration	Code	Spec.	Details
 No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

COIL SPRINGS

—EXTRA HEAVY LOAD SWB—



Load ±10% RoHS
Squareness 2° or less
Free length L 50 or less±0.5mm
55 or more±1%
D[T] is $^{0}_{-1.0}$ for ϕ70.

Coil direction Right : Sectional drawing

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm {kgf/mm}	F=L×16%		F=L×18%		F=L×20%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
6	3	15	59.0{6.0}	2.4	142{14}	2.7	159{16}	3.0	177{18}	SWB 6−15	
		20	44.3{4.5}	3.2		3.6		4.0		20	
		25	35.4{3.6}	4.0		4.5		5.0		25	
		30	29.5{3.0}	4.8		5.4		6.0		30	
		35	25.3{2.6}	5.6		6.3		7.0		35	
		40	22.1{2.3}	6.4		7.2		8.0		40	
		45	19.7{2.0}	7.2		8.1		9.0		45	
		50	17.7{1.8}	8.0		9.0		10.0		50	
		55	16.1{1.6}	8.8		9.9		11.0		55	
		60	14.8{1.5}	9.6		10.8		12.0		60	
8	4	10	162{16.5}	1.6	258{26}	1.8	291{30}	2.0	323{33}	SWB 8−10	
		15	108{11.0}	2.4		2.7		3.0		15	
		20	80.8{8.2}	3.2		3.6		4.0		20	
		25	64.6{6.6}	4.0		4.5		5.0		25	
		30	53.8{5.5}	4.8		5.4		6.0		30	
		35	46.1{4.7}	5.6		6.3		7.0		35	
		40	40.4{4.1}	6.4		7.2		8.0		40	
		45	35.9{3.7}	7.2		8.1		9.0		45	
		50	32.3{3.3}	8.0		9.0		10.0		50	
		55	29.4{3.0}	8.8		9.9		11.0		55	
		60	26.9{2.7}	9.6		10.8		12.0		60	
		65	24.8{2.5}	10.4		11.7		13.0		65	
		70	23.1{2.4}	11.2		12.6		14.0		70	
		75	21.5{2.2}	12.0		13.5		15.0		75	
		80	20.2{2.1}	12.8		14.4		16.0		80	
10	5	10	221{22.5}	1.6	353{36}	1.8	397{41}	2.0	441{45}	SWB 10−10	
		15	147{15.0}	2.4		2.7		3.0		15	
		20	110{11.2}	3.2		3.6		4.0		20	
		25	88.2{9.0}	4.0		4.5		5.0		25	
		30	73.5{7.5}	4.8		5.4		6.0		30	
		35	63.0{6.4}	5.6		6.3		7.0		35	
		40	55.1{5.6}	6.4		7.2		8.0		40	
		45	49.0{5.0}	7.2		8.1		9.0		45	Quotation
		50	44.1{4.5}	8.0		9.0		10.0		50	
		55	40.1{4.1}	8.8		9.9		11.0		55	
		60	36.8{3.7}	9.6		10.8		12.0		60	
		65	33.9{3.5}	10.4		11.7		13.0		65	
		70	31.5{3.2}	11.2		12.6		14.0		70	
		75	29.4{3.0}	12.0		13.5		15.0		75	
		80	27.6{2.8}	12.8		14.4		16.0		80	
		90	24.5{2.5}	14.4		16.2		18.0		90	
12	6	15	190{19.3}	2.4	455{46}	2.7	512{52}	3.0	569{58}	SWB 12−15	
		20	142{14.5}	3.2		3.6		4.0		20	
		25	114{11.6}	4.0		4.5		5.0		25	
		30	94.8{9.7}	4.8		5.4		6.0		30	
		35	81.3{8.3}	5.6		6.3		7.0		35	
		40	71.1{7.3}	6.4		7.2		8.0		40	
		45	63.2{6.4}	7.2		8.1		9.0		45	
		50	56.9{5.8}	8.0		9.0		10.0		50	
		55	51.7{5.3}	8.8		9.9		11.0		55	
		60	47.4{4.8}	9.6		10.8		12.0		60	
		65	43.8{4.5}	10.4		11.7		13.0		65	
		70	40.6{4.1}	11.2		12.6		14.0		70	
		75	37.9{3.9}	12.0		13.5		15.0		75	
		80	35.6{3.6}	12.8		14.4		16.0		80	
		90	31.6{3.2}	14.4		16.2		18.0		90	
14	7	20	184{18.8}	3.2	589{60}	3.6	662{68}	4.0	736{75}	SWB 14−20	
		25	147{15.0}	4.0		4.5		5.0		25	
		30	123{12.5}	4.8		5.4		6.0		30	
		35	105{10.7}	5.6		6.3		7.0		35	
		40	92.0{9.4}	6.4		7.2		8.0		40	
		45	81.8{8.3}	7.2		8.1		9.0		45	
		50	73.6{7.5}	8.0		9.0		10.0		50	
		55	66.9{6.8}	8.8		9.9		11.0		55	
		60	61.3{6.3}	9.6		10.8		12.0		60	
		65	56.6{5.8}	10.4		11.7		13.0		65	
		70	52.6{5.4}	11.2		12.6		14.0		70	
		75	49.1{5.0}	12.0		13.5		15.0		75	
		80	46.0{4.7}	12.8		14.4		16.0		80	
		90	40.9{4.2}	14.4		16.2		18.0		90	
		100	36.8{3.8}	16.0		18.0		20.0		100	
16	8	20	245{25.0}	3.2	784{80}	3.6	882{90}	4.0	980{100}	SWB 16−20	
		25	196{20.0}	4.0		4.5		5.0		25	
		30	163{16.7}	4.8		5.4		6.0		30	
		35	140{14.3}	5.6		6.3		7.0		35	
		40	123{12.5}	6.4		7.2		8.0		40	
		45	109{11.1}	7.2		8.1		9.0		45	
		50	98.0{10.0}	8.0		9.0		10.0		50	
		55	89.1{9.1}	8.8		9.9		11.0		55	
		60	81.7{8.3}	9.6		10.8		12.0		60	
		65	75.4{7.7}	10.4		11.7		13.0		65	
		70	70.0{7.1}	11.2		12.6		14.0		70	
		75	65.3{6.7}	12.0		13.5		15.0		75	
		80	61.3{6.3}	12.8		14.4		16.0		80	
		90	54.4{5.6}	14.4		16.2		18.0		90	
		100	49.0{5.0}	16.0		18.0		20.0		100	
18	9	20	306{31.2}	3.2	980{100}	3.6	1103{113}	4.0	1225{125}	SWB 18−20	
		25	245{25.0}	4.0		4.5		5.0		25	
		30	204{20.8}	4.8		5.4		6.0		30	
		35	175{17.8}	5.6		6.3		7.0		35	
		40	153{15.6}	6.4		7.2		8.0		40	
		45	136{13.9}	7.2		8.1		9.0		45	
		50	123{12.5}	8.0		9.0		10.0		50	
		55	111{11.4}	8.8		9.9		11.0		55	
		60	102{10.4}	9.6		10.8		12.0		60	
		65	94.2{9.6}	10.4		11.7		13.0		65	
		70	87.5{8.9}	11.2		12.6		14.0		70	
		75	81.7{8.3}	12.0		13.5		15.0		75	
		80	76.6{7.8}	12.8		14.4		16.0		80	
		90	68.1{6.9}	14.4		16.2		18.0		90	
		100	61.3{6.2}	16.0		18.0		20.0		100	Quotation
20	10	20	392{40.0}	3.2	1254{128}	3.6	1411{144}	4.0	1568{160}	SWB 20−20	
		25	314{32.0}	4.0		4.5		5.0		25	
		30	261{26.6}	4.8		5.4		6.0		30	
		35	224{22.8}	5.6		6.3		7.0		35	
		40	196{20.0}	6.4		7.2		8.0		40	
		45	174{17.8}	7.2		8.1		9.0		45	
		50	157{16.0}	8.0		9.0		10.0		50	
		55	143{14.5}	8.8		9.9		11.0		55	
		60	131{13.3}	9.6		10.8		12.0		60	
		65	121{12.3}	10.4		11.7		13.0		65	
		70	112{11.4}	11.2		12.6		14.0		70	
		75	105{10.7}	12.0		13.5		15.0		75	
		80	98.0{10.0}	12.8		14.4		16.0		80	
		90	87.1{8.9}	14.4		16.2		18.0		90	
		100	78.4{8.0}	16.0		18.0		20.0		100	
		125	62.7{6.4}	20.0		22.5		25.0		125	
		150	52.3{5.3}	24.0		27.0		30.0		150	
22	11	25	382{39.0}	4.0	1530{156}	4.5	1721{175}	5.0	1912{195}	SWB 22−25	
		30	319{32.5}	4.8		5.4		6.0		30	
		35	273{27.9}	5.6		6.3		7.0		35	
		40	239{24.4}	6.4		7.2		8.0		40	
		45	212{21.7}	7.2		8.1		9.0		45	
		50	191{19.5}	8.0		9.0		10.0		50	
		55	174{17.7}	8.8		9.9		11.0		55	
		60	159{16.2}	9.6		10.8		12.0		60	
		65	147{15.0}	10.4		11.7		13.0		65	
		70	137{13.9}	11.2		12.6		14.0		70	
		75	127{13.0}	12.0		13.5		15.0		75	
		80	120{12.2}	12.8		14.4		16.0		80	
		90	106{10.8}	14.4		16.2		18.0		90	
		100	95.6{9.8}	16.0		18.0		20.0		100	
		125	76.5{7.8}	20.0		22.5		25.0		125	
		150	63.7{6.5}	24.0		27.0		30.0		150	
25	12.5	25	481{49.0}	4.0	1922{196}	4.5	2162{220}	5.0	2403{245}	SWB 25−25	
		30	400{40.8}	4.8		5.4		6.0		30	
		35	343{35.0}	5.6		6.3		7.0		35	
		40	300{30.6}	6.4		7.2		8.0		40	
		45	267{27.2}	7.2		8.1		9.0		45	
		50	240{24.5}	8.0		9.0		10.0		50	
		55	218{22.3}	8.8		9.9		11.0		55	
		60	200{20.4}	9.6		10.8		12.0		60	
		65	185{18.8}	10.4		11.7		13.0		65	
		70	172{17.5}	11.2		12.6		14.0		70	
		75	160{16.3}	12.0		13.5		15.0		75	
		80	150{15.3}	12.8		14.4		16.0		80	
		90	133{13.6}	14.4		16.2		18.0		90	
		100	120{12.2}	16.0		18.0		20.0		100	
		125	96.1{9.8}	20.0		22.5		25.0		125	
		150	80.1{8.2}	24.0		27.0		30.0		150	
		175	68.6{7.0}	28.0		31.5		35.0		175	
27	13.5	25	569{58.0}	4.0	2275{232}	4.5	2560{261}	5.0	2844{290}	SWB 27−25	
		30	474{48.3}	4.8		5.4		6.0		30	
		35	406{41.4}	5.6		6.3		7.0		35	
		40	355{36.2}	6.4		7.2		8.0		40	
		45	316{32.2}	7.2		8.1		9.0		45	
		50	284{29.0}	8.0		9.0		10.0		50	
		55	259{26.4}	8.8		9.9		11.0		55	
		60	237{24.2}	9.6		10.8		12.0		60	
		65	219{22.3}	10.4		11.7		13.0		65	
		70	203{20.7}	11.2		12.6		14.0		70	
		75	190{19.3}	12.0		13.5		15.0		75	
		80	178{18.1}	12.8		14.4		16.0		80	
		90	158{16.1}	14.4		16.2		18.0		90	
		100	142{14.5}	16.0		18.0		20.0		100	
		125	114{11.6}	20.0		22.5		25.0		125	
		150	94.8{9.7}	24.0		27.0		30.0		150	
		175	81.3{8.3}	28.0		31.5		35.0		175	Quotation
30	15	25	706{72.0}	4.0	2824{288}	4.5	3177{324}	5.0	3530{360}	SWB 30−25	
		30	588{60.0}	4.8		5.4		6.0		30	
		35	504{51.4}	5.6		6.3		7.0		35	
		40	441{45.0}	6.4		7.2		8.0		40	
		45	392{40.0}	7.2		8.1		9.0		45	
		50	353{36.0}	8.0		9.0		10.0		50	
		55	321{32.7}	8.8		9.9		11.0		55	
		60	294{30.0}	9.6		10.8		12.0		60	
		65	272{27.7}	10.4		11.7		13.0		65	
		70	252{25.7}	11.2		12.6		14.0		70	
		75	235{24.0}	12.0		13.5		15.0		75	
		80	221{22.5}	12.8		14.4		16.0		80	
		90	196{20.0}	14.4		16.2		18.0		90	
		100	177{18.0}	16.0		18.0		20.0		100	
		125	141{14.4}	20.0		22.5		25.0		125	
		150	118{12.0}	24.0		27.0		30.0		150	
		175	101{10.3}	28.0		31.5		35.0		175	
		200	88.3{9.0}	32.0		36.0		40.0		200	
35	17.5	40	600{61.2}	6.4	3842{392}	7.2	4322{441}	8.0	4802{490}	SWB 35−40	
		45	534{54.4}	7.2		8.1		9.0		45	
		50	480{49.0}	8.0		9.0		10.0		50	
		55	437{44.5}	8.8		9.9		11.0		55	
		60	400{40.8}	9.6		10.8		12.0		60	
		65	369{37.7}	10.4		11.7		13.0		65	
		70	343{35.0}	11.2		12.6		14.0		70	
		75	320{32.6}	12.0		13.5		15.0		75	
		80	300{30.6}	12.8		14.4		16.0		80	
		90	267{27.2}	14.4		16.2		18.0		90	
		100	240{24.5}	16.0		18.0		20.0		100	
		125	192{19.6}	20.0		22.5		25.0		125	
		150	160{16.3}	24.0		27.0		30.0		150	
		175	137{14.0}	28.0		31.5		35.0		175	
		200	120{12.2}	32.0		36.0		40.0		200	
40	20	40	784{79.9}	6.4	5018{512}	7.2	5645{576}	8.0	6272{640}	SWB 40−40	
		45	697{71.1}	7.2		8.1		9.0		45	
		50	627{64.0}	8.0		9.0		10.0		50	
		55	570{58.1}	8.8		9.9		11.0		55	
		60	523{53.3}	9.6		10.8		12.0		60	
		65	482{49.2}	10.4		11.7		13.0		65	
		70	448{45.7}	11.2		12.6		14.0		70	
		75	418{42.6}	12.0		13.5		15.0		75	
		80	392{40.0}	12.8		14.4		16.0		80	
		90	348{35.5}	14.4		16.2		18.0		90	
		100	314{32.0}	16.0		18.0		20.0		100	
		125	251{25.6}	20.0		22.5		25.0		125	
		150	209{21.3}	24.0		27.0		30.0		150	
		175	179{18.3}	28.0		31.5		35.0		175	
		200	157{16.0}	32.0		36.0		40.0		200	
		225	139{14.2}	36.0		40.5		45.0		225	
		250	125{12.8}	40.0		45.0		50.0		250	
		275	114{11.6}	44.0		49.5		55.0		275	
		300	105{10.7}	48.0		54.0		60.0		300	
50	25	50	980{100.0}	8.0	7840{800}	9.0	8820{900}	10.0	9800{1000}	SWB 50−50	
		55	891{90.9}	8.8		9.9		11.0		55	
		60	817{83.3}	9.6		10.8		12.0		60	
		65	754{76.9}	10.4		11.7		13.0		65	
		70	700{71.4}	11.2		12.6		14.0		70	
		75	653{66.7}	12.0		13.5		15.0		75	
		80	613{62.5}	12.8		14.4		16.0		80	
		90	544{55.6}	14.4		16.2		18.0		90	
		100	490{50.0}	16.0		18.0		20.0		100	
		125	392{40.0}	20.0		22.5		25.0		125	
		150	327{33.3}	24.0		27.0		30.0		150	
		175	280{28.6}	28.0		31.5		35.0		175	Quotation
		200	245{25.0}	32.0		36.0		40.0		200	
		225	218{22.2}	36.0		40.5		45.0		225	
		250	196{20.0}	40.0		45.0		50.0		250	
		275	178{18.2}	44.0		49.5		55.0		275	
		300	163{16.7}	48.0		54.0		60.0		300	
		350	140{14.3}	56.0		63.0		70.0		350	
60	30	60	1176{120.0}	9.6	11290{1152}	10.8	12701{1296}	12.0	14112{1440}	SWB 60−60	
		70	1008{102.9}	11.2		12.6		14.0		70	
		80	882{90.0}	12.8		14.4		16.0		80	
		90	784{80.0}	14.4		16.2		18.0		90	
		100	706{72.0}	16.0		18.0		20.0		100	
		125	564{57.6}	20.0		22.5		25.0		125	
		150	470{48.0}	24.0		27.0		30.0		150	
		175	403{41.1}	28.0		31.5		35.0		175	
		200	353{36.0}	32.0		36.0		40.0		200	
		225	314{32.0}	36.0		40.5		45.0		225	
		250	282{28.8}	40.0		45.0		50.0		250	
		275	257{26.2}	44.0		49.5		55.0		275	
		300	235{24.0}	48.0		54.0		60.0		300	
		350	202{20.6}	56.0		63.0		70.0		350	
70	38.5	70	1219{124.3}	11.2	13655{1392}	12.6	15362{1567}	14.0	17069{1740}	SWB 70−70	
		80	1067{108.8}	12.8		14.4		16.0		80	
		90	948{96.7}	14.4		16.2		18.0		90	
		100	853{87.0}	16.0		18.0		20.0		100	
		125	683{69.6}	20.0		22.5		25.0		125	
		150	569{58.0}	24.0		27.0		30.0		150	
		175	488{49.7}	28.0		31.5		35.0		175	
		200	427{43.5}	32.0		36.0		40.0		200	
		250	341{34.8}	40.0		45.0		50.0		250	
		300	284{29.0}	48.0		54.0		60.0		300	
		350	244{24.9}	56.0		63.0		70.0		350	
Operation frequency				One million times		500,000 times		300,000 times			

Order Part Number
SWB20−80

Days to Ship Quotation

Price Quotation

M Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

●Load calculation method: Load=Spring constant×Deflection
(International unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

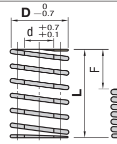
Product guide P.1219　Load deflection diagram P.1258
Instructions and notes for coil springs P.1221

Alterations
(NT) − Part Number
NT − SWB 30−60
Quotation

Alteration	Code	Spec.	Details
 No painting	NT	**Paint peeling** Peel the coating by shot peening. Since the springs which have undergone the painting peeling are easy to rust, be careful in handling. A rusted spring could cause early breakage. Compared to painted springs, there may be some dispersions in terms of load, etc. depending on the lot.	P.1257

COIL SPRINGS

—HYPER HEAVY LOAD　SWG—



Load	±10%	RoHS
Squareness	2° or less	
Free length L	50 or less±0.5mm	
	55 or more±1%	

Coil direction Right: :Sectional drawing

For information on the D dimension and the counterbore hole,and also the d dimension and the shaft, P.1221

D	d	L	Spring constant N/mm{kgf/mm}	F=L×16%		F=L×18%		F=L×20%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
10	5	15	163 {16.7}	2.4	392 {40}	2.7	441 {45}	Outside allowable range		SWG 10−15	
		20	123 {12.5}	3.2		3.6		4.0	490 {50}	20	
		25	98.1 {10.0}	4.0		4.5		5.0		25	
		30	81.7 {8.3}	4.8		5.4		6.0		30	
		35	70.0 {7.1}	5.6		6.3		7.0		35	
		40	61.3 {6.3}	6.4		7.2		8.0		40	
		45	54.5 {5.6}	7.2		8.1		9.0		45	
		50	49.0 {5.0}	8.0		9.0		10.0		50	
		55	44.6 {4.5}	8.8		9.9		11.0		55	
		60	40.9 {4.2}	9.6		10.8		12.0		60	
		65	37.7 {3.8}	10.4		11.7		13.0		65	
		70	35.0 {3.6}	11.2		12.6		14.0		70	
		75	32.7 {3.3}	12.0		13.5		15.0		75	
		80	30.6 {3.1}	12.8		14.4		16.0		80	
		90	27.2 {2.8}	14.4		16.2		18.0		90	
		100	24.5 {2.5}	16.0		18.0		20.0		100	
12	6	15	245 {25.0}	2.4	588 {60}	2.7	662 {68}	Outside allowable range		SWG 12−15	
		20	184 {18.8}	3.2		3.6		4.0	735 {75}	20	
		25	147 {15.0}	4.0		4.5		5.0		25	
		30	123 {12.5}	4.8		5.4		6.0		30	
		35	105 {10.7}	5.6		6.3		7.0		35	
		40	91.9 {9.4}	6.4		7.2		8.0		40	
		45	81.7 {8.3}	7.2		8.1		9.0		45	
		50	73.5 {7.5}	8.0		9.0		10.0		50	
		55	66.9 {6.8}	8.8		9.9		11.0		55	
		60	61.3 {6.3}	9.6		10.8		12.0		60	
		65	56.6 {5.8}	10.4		11.7		13.0		65	
		70	52.5 {5.4}	11.2		12.6		14.0		70	
		75	49.0 {5.0}	12.0		13.5		15.0		75	Quotation
		80	46.0 {4.7}	12.8		14.4		16.0		80	
		90	40.9 {4.2}	14.4		16.2		18.0		90	
		100	36.8 {3.8}	16.0		18.0		20.0		100	
14	7	20	238 {24.3}	3.2	761 {78}	3.6	856 {87}	Outside allowable range		SWG 14−20	
		25	190 {19.4}	4.0		4.5		5.0	951 {97}	25	
		30	159 {16.2}	4.8		5.4		6.0		30	
		35	136 {13.9}	5.6		6.3		7.0		35	
		40	119 {12.1}	6.4		7.2		8.0		40	
		45	106 {10.8}	7.2		8.1		9.0		45	
		50	95.1 {9.7}	8.0		9.0		10.0		50	
		55	86.5 {8.8}	8.8		9.9		11.0		55	
		60	79.3 {8.1}	9.6		10.8		12.0		60	
		65	73.2 {7.5}	10.4		11.7		13.0		65	
		70	67.9 {6.9}	11.2		12.6		14.0		70	
		75	63.4 {6.5}	12.0		13.5		15.0		75	
		80	59.5 {6.1}	12.8		14.4		16.0		80	
		90	52.8 {5.4}	14.4		16.2		18.0		90	
		100	47.6 {4.9}	16.0		18.0		20.0		100	
16	8	20	319 {32.5}	3.2	1020 {104}	3.6	1147 {117}	Outside allowable range		SWG 16−20	
		25	255 {26.0}	4.0		4.5		5.0	1275 {130}	25	
		30	212 {21.7}	4.8		5.4		6.0		30	
		35	182 {18.6}	5.6		6.3		7.0		35	
		40	159 {16.3}	6.4		7.2		8.0		40	
		45	142 {14.4}	7.2		8.1		9.0		45	
		50	127 {13.0}	8.0		9.0		10.0		50	
		55	116 {11.8}	8.8		9.9		11.0		55	
		60	106 {10.8}	9.6		10.8		12.0		60	
		65	98.1 {10.0}	10.4		11.7		13.0		65	
		70	91.1 {9.3}	11.2		12.6		14.0		70	
		75	85.0 {8.7}	12.0		13.5		15.0		75	
		80	79.7 {8.1}	12.8		14.4		16.0		80	
		90	70.8 {7.2}	14.4		16.2		18.0		90	
		100	63.7 {6.5}	16.0		18.0		20.0		100	
Operation frequency				One million times		500,000 times		300,000 times			

D	d	L	Spring constant N/mm{kgf/mm}	F=L×16%		F=L×18%		F=L×20%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
18	9	20	392 {40.0}	3.2	1255 {128}	3.6	1412 {144}	Outside allowable range		SWG 18−20	
		25	314 {32.0}	4.0		4.5		5.0	1569 {160}	25	
		30	262 {26.7}	4.8		5.4		6.0		30	
		35	224 {22.9}	5.6		6.3		7.0		35	
		40	196 {20.0}	6.4		7.2		8.0		40	
		45	174 {17.8}	7.2		8.1		9.0		45	
		50	157 {16.0}	8.0		9.0		10.0		50	
		55	143 {14.5}	8.8		9.9		11.0		55	
		60	131 {13.3}	9.6		10.8		12.0		60	
		65	121 {12.3}	10.4		11.7		13.0		65	
		70	112 {11.4}	11.2		12.6		14.0		70	
		75	105 {10.7}	12.0		13.5		15.0		75	
		80	98.1 {10.0}	12.8		14.4		16.0		80	
		90	87.2 {8.9}	14.4		16.2		18.0		90	
		100	78.5 {8.0}	16.0		18.0		20.0		100	
20	10	20	515 {52.5}	3.2	1648 {168}	3.6	1853 {189}	Outside allowable range		SWG 20−20	
		25	412 {42.0}	4.0		4.5		5.0	2059 {210}	25	
		30	343 {35.0}	4.8		5.4		6.0		30	
		35	294 {30.0}	5.6		6.3		7.0		35	
		40	257 {26.3}	6.4		7.2		8.0		40	
		45	229 {23.3}	7.2		8.1		9.0		45	
		50	206 {21.0}	8.0		9.0		10.0		50	
		55	187 {19.1}	8.8		9.9		11.0		55	
		60	172 {17.5}	9.6		10.8		12.0		60	
		65	158 {16.2}	10.4		11.7		13.0		65	
		70	147 {15.0}	11.2		12.6		14.0		70	
		75	137 {14.0}	12.0		13.5		15.0		75	
		80	129 {13.1}	12.8		14.4		16.0		80	
		90	114 {11.7}	14.4		16.2		18.0		90	Quotation
		100	103 {10.5}	16.0		18.0		20.0		100	
		125	82.4 {8.4}	20.0		22.5		25.0		125	
22	11	20	588 {60.0}	3.2	1883 {192}	3.6	2118 {216}	Outside allowable range		SWG 22−20	
		25	471 {48.0}	4.0		4.5		5.0	2354 {240}	25	
		30	392 {40.0}	4.8		5.4		6.0		30	
		35	336 {34.3}	5.6		6.3		7.0		35	
		40	294 {30.0}	6.4		7.2		8.0		40	
		45	262 {26.7}	7.2		8.1		9.0		45	
		50	235 {24.0}	8.0		9.0		10.0		50	
		55	214 {21.8}	8.8		9.9		11.0		55	
		60	196 {20.0}	9.6		10.8		12.0		60	
		65	181 {18.5}	10.4		11.7		13.0		65	
		70	168 {17.1}	11.2		12.6		14.0		70	
		75	157 {16.0}	12.0		13.5		15.0		75	
		80	147 {15.0}	12.8		14.4		16.0		80	
		90	131 {13.3}	14.4		16.2		18.0		90	
		100	118 {12.0}	16.0		18.0		20.0		100	
		125	94.1 {9.6}	20.0		22.5		25.0		125	
25	12.5	20	760 {77.5}	3.2	2432 {248}	3.6	2736 {279}	Outside allowable range		SWG 25−20	
		25	608 {62.0}	4.0		4.5		5.0	3040 {310}	25	
		30	507 {51.7}	4.8		5.4		6.0		30	
		35	434 {44.3}	5.6		6.3		7.0		35	
		40	380 {38.8}	6.4		7.2		8.0		40	
		45	338 {34.4}	7.2		8.1		9.0		45	
		50	304 {31.0}	8.0		9.0		10.0		50	
		55	276 {28.2}	8.8		9.9		11.0		55	
		60	253 {25.8}	9.6		10.8		12.0		60	
		65	234 {23.8}	10.4		11.7		13.0		65	
		70	217 {22.1}	11.2		12.6		14.0		70	
		75	203 {20.7}	12.0		13.5		15.0		75	
		80	190 {19.4}	12.8		14.4		16.0		80	
		90	169 {17.2}	14.4		16.2		18.0		90	
		100	152 {15.5}	16.0		18.0		20.0		100	
		125	121.6 {12.4}	20.0		22.5		25.0		125	
Operation frequency				One million times		500,000 times		300,000 times			

The maximum deflection of shapes marked with "Outside allowable range" is 18%. Avoid using when deflection is more than 18%.

D	d	L	Spring constant N/mm{kgf/mm}	F=L×16%		F=L×18%		F=L×20%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
27	13.5	20	907 {92.5}	3.2	2903 {296}	3.6	3266 {333}	Outside allowable range		SWG 27−20	
		25	726 {74.0}	4.0		4.5		5.0	3628 {370}	25	
		30	605 {61.7}	4.8		5.4		6.0		30	
		35	518 {52.9}	5.6		6.3		7.0		35	
		40	454 {46.3}	6.4		7.2		8.0		40	
		45	403 {41.1}	7.2		8.1		9.0		45	
		50	363 {37.0}	8.0		9.0		10.0		50	
		55	330 {33.6}	8.8		9.9		11.0		55	
		60	302 {30.8}	9.6		10.8		12.0		60	
		65	279 {28.5}	10.4		11.7		13.0		65	
		70	259 {26.4}	11.2		12.6		14.0		70	
		75	242 {24.7}	12.0		13.5		15.0		75	
		80	227 {23.1}	12.8		14.4		16.0		80	
		90	202 {20.6}	14.4		16.2		18.0		90	
		100	181 {18.5}	16.0		18.0		20.0		100	
		125	145 {14.8}	20.0		22.5		25.0		125	
		150	121 {12.3}	24.0		27.0		30.0		150	
30	15	20	1177 {120.0}	3.2	3766 {384}	3.6	4236 {432}	Outside allowable range		SWG 30−20	
		25	941 {96.0}	4.0		4.5		5.0	4707 {480}	25	
		30	785 {80.0}	4.8		5.4		6.0		30	
		35	672 {68.6}	5.6		6.3		7.0		35	
		40	588 {60.0}	6.4		7.2		8.0		40	
		45	523 {53.3}	7.2		8.1		9.0		45	
		50	471 {48.0}	8.0		9.0		10.0		50	
		55	428 {43.6}	8.8		9.9		11.0		55	Quotation
		60	392 {40.0}	9.6		10.8		12.0		60	
		65	362 {36.9}	10.4		11.7		13.0		65	
		70	336 {34.3}	11.2		12.6		14.0		70	
		75	314 {32.0}	12.0		13.5		15.0		75	
		80	294 {30.0}	12.8		14.4		16.0		80	
		90	262 {26.7}	14.4		16.2		18.0		90	
		100	235 {24.0}	16.0		18.0		20.0		100	
		125	188 {19.2}	20.0		22.5		25.0		125	
		150	157 {16.0}	24.0		27.0		30.0		150	
		175	134 {13.7}	28.0		31.5		35.0		175	
		200	118 {12.0}	32.0		36.0		40.0		200	
35	17.5	30	1030 {105.0}	4.8	4943 {504}	5.4	5560 {567}	6.0	6178 {630}	SWG 35−30	
		35	883 {90.0}	5.6		6.3		7.0		35	
		40	772 {78.8}	6.4		7.2		8.0		40	
		45	686 {70.0}	7.2		8.1		9.0		45	
		50	618 {63.0}	8.0		9.0		10.0		50	
		55	562 {57.3}	8.8		9.9		11.0		55	
		60	515 {52.5}	9.6		10.8		12.0		60	
		65	475 {48.5}	10.4		11.7		13.0		65	
		70	441 {45.0}	11.2		12.6		14.0		70	
		75	412 {42.0}	12.0		13.5		15.0		75	
		80	386 {39.4}	12.8		14.4		16.0		80	
		90	343 {35.0}	14.4		16.2		18.0		90	
		100	309 {31.5}	16.0		18.0		20.0		100	
		125	247 {25.2}	20.0		22.5		25.0		125	
		150	206 {21.0}	24.0		27.0		30.0		150	
		175	177 {18.0}	28.0		31.5		35.0		175	
		200	154 {15.8}	32.0		36.0		40.0		200	
Operation frequency				One million times		500,000 times		300,000 times			

D	d	L	Spring constant N/mm{kgf/mm}	F=L×16%		F=L×18%		F=L×20%		Part Number	U/Price
				Fmm	Load N{kgf}	Fmm	Load N{kgf}	Fmm	Load N{kgf}	Type D−L	1~19
40	20	35	1149 {117.1}	5.6	6433 {656}	6.3	7237 {738}	7.0	8041 {820}	SWG 40−35	
		40	1005 {102.5}	6.4		7.2		8.0		40	
		45	893 {91.1}	7.2		8.1		9.0		45	
		50	804 {82.0}	8.0		9.0		10.0		50	
		55	731 {74.5}	8.8		9.9		11.0		55	
		60	670 {68.3}	9.6		10.8		12.0		60	
		65	619 {63.1}	10.4		11.7		13.0		65	
		70	574 {58.6}	11.2		12.6		14.0		70	
		75	536 {54.7}	12.0		13.5		15.0		75	
		80	503 {51.3}	12.8		14.4		16.0		80	
		90	447 {45.6}	14.4		16.2		18.0		90	
		100	402 {41.0}	16.0		18.0		20.0		100	Quotation
		125	322 {32.8}	20.0		22.5		25.0		125	
		150	268 {27.3}	24.0		27.0		30.0		150	
		175	230 {23.4}	28.0		31.5		35.0		175	
		200	201 {20.5}	32.0		36.0		40.0		200	
50	25	50	1226 {125.0}	8.0	9807 {1000}	9.0	11032 {1125}	10.0	12258 {1250}	SWG 50−50	
		55	1114 {113.6}	8.8		9.9		11.0		55	
		60	1022 {104.2}	9.6		10.8		12.0		60	
		65	943 {96.2}	10.4		11.7		13.0		65	
		70	876 {89.3}	11.2		12.6		14.0		70	
		75	817 {83.3}	12.0		13.5		15.0		75	
		80	766 {78.1}	12.8		14.4		16.0		80	
		90	681 {69.4}	14.4		16.2		18.0		90	
		100	613 {62.5}	16.0		18.0		20.0		100	
		125	490 {50.0}	20.0		22.5		25.0		125	
		150	409 {41.7}	24.0		27.0		30.0		150	
		175	350 {35.7}	28.0		31.5		35.0		175	
		200	306 {31.3}	32.0		36.0		40.0		200	
Operation frequency				One million times		500,000 times		300,000 times			

M Equivalent of SWOSC−V (Steel Wire Oil Temper Silicon for Valve)

- Load calculation method: Load＝Spring constant×Deflection
  (International unit) N＝N/mm×Fmm
  kgf＝kgf/mm×Fmm
  (kgf＝N×0.101972)

Product guide **P.1219**

Instructions and notes for coil springs **P.1221**

Load deflection diagram **P.1258**

■Characteristics

- Tolerates about 1.1~1.3 times heavier loads with the same deflection as SWB (P.1253). Saves space for the mold and reduces the number of springs.
- SWG is electrocoated, which realizes superior corrosion resistance than regular painting. In addition, it is harder to peel off than regular one.

Order — **Part Number**
SWG20−80

Days to Ship — Quotation

Price — Quotation

ALTERATION OF PAINT-PEELING OF COIL SPRING

—GUIDE—

We stock all our coil spring products after painting for the purpose of identification and rustproofing. However, in an attempt to satisfy customers who are troubled by coating coming off, we have started providing alteration of paint-peeling of coil springs.

Regular painted product

Paint peeled product

Guide for alteration of paint-peeling

Alteration of paint-peeling applies shot peeling to the painted coil springs to peel off its painting,then grease is applied for rust prevention. After the total processing, the paint for identification is completely peeled off, and the bare spring material is exposed.

<Painting peeling process: outline>

Painted coil springs (finish product) ⇨ **Paint peeling by shot peening** ⇨ **Tempering** ⇨ **Applying antirust agent** ⇨ **Delivery**

Applicable springs

Coil springs : Applicable for SWY (D=11~42), SWU (D=10.5~43), SWR (D=10.5~50), SWS (D=10.5~37), SWN (D=14.5~37), SWC (D=6~30), SWF (D=6~70), SWL (D=6~70), SWM (D=6~70), SWH (D=6~70), SWB. (D=6~70)

⊗ Coil spring SWG, SWZ (for press mold) not applicable.

Note on handling

- Although antirust agent is applied to the paint-peeled springs, silicon chrome steel oil temper line (SWOSC—V) painted on the coil springs is extremely vulnerable to rust. Please be careful in handling them.
- Since rusted springs could cause early breakage, we recommend customers to reduce the deflection rate of paint-peeled springs compared to the regular painted products and replace them periodically depending on the usage environment. Early use after purchasing is also recommended.
- Compared to regular painted springs, there may be some dispersions in terms of load and length, etc. depending on the lot.
- Since paint-peeled products are difficult to identify even from line thickness or the number of turns, please manage them carefully.

Order When you order alteration of paint-peeling, please put "NT" before part number on the ordering sheet.

NT — SWU26 — 80

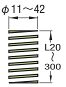
Paint peeling **Regular part number**

Days to Ship **Quotation**

COIL SPRING LOAD DEFLECTION DIAGRAMS

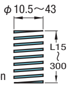
■For high deflection type

SWY Ultra high deflection



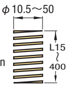
Operation frequency	One million times	300,000 times
Deflection rate	65%	70%

SWU Super high deflection



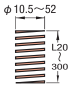
Operation frequency	One million times	300,000 times
Deflection rate	60%	65%

SWR High deflection



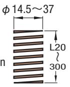
Operation frequency	One million times	300,000 times
Deflection rate	50%	55%

SWS Medium deflection



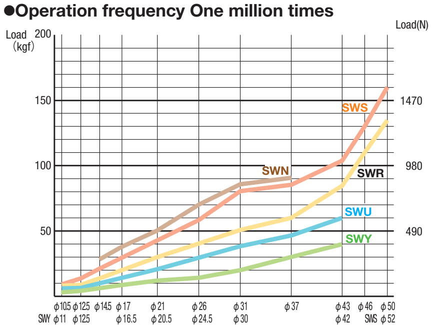
Operation frequency	One million times	300,000 times
Deflection rate	40%	45%

SWN Low deflection



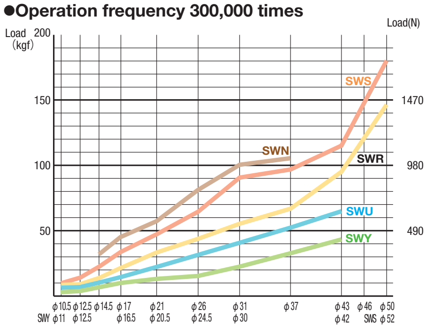
Operation frequency	One million times	300,000 times
Deflection rate	30%	35%

●Operation frequency One million times



・Load{kgf}=Load N×0.101972

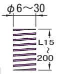
●Operation frequency 300,000 times



・Load{kgf}=Load N×0.101972

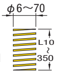
■High load type

SWC Extra minimal load



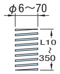
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	50%	55%	60%

SWF Minimal load



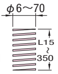
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	40%	45%	50%

SWL Light load



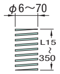
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	32%	36%	40%

SWM Medium load



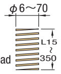
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	25.5%	28.8%	32%

SWH Heavy load



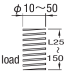
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	19.2%	21.6%	24%

SWB Extra heavy load



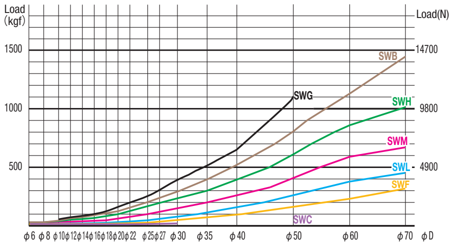
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	16%	18%	20%

SWG Hyper heavy load



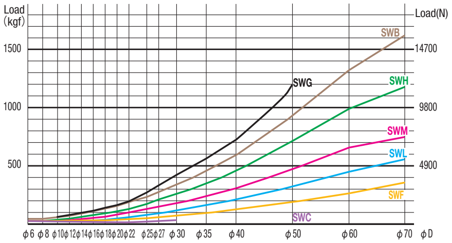
Operation frequency	One million times	500,000 times	300,000 times
Deflection rate	16%	18%	20%

●Operation frequency One million times



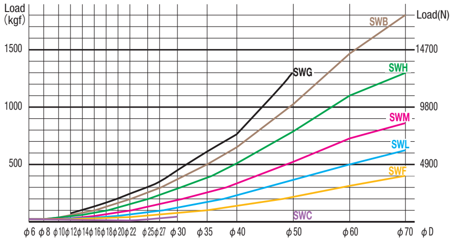
・Load{kgf}=Load N×0.101972

●Operation frequency 500,000 times



・Load{kgf}=Load N×0.101972

●Operation frequency 300,000 times



・Load{kgf}=Load N×0.101972

GATE-CUT SPRINGS／WASHERS FOR COIL SPRINGS

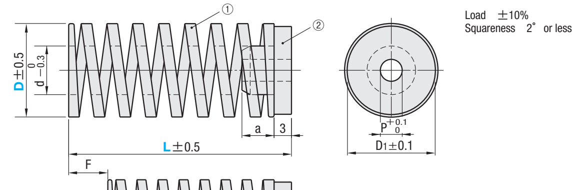
—HEAT RESISTANT 120℃／200℃TYPE—

Non JIS material definition is listed on P.1351 - 1352

WSV (200℃heat resistant type) is painted with a vertical white line for identification.

RoHS
WSW
WSV

WSW
WSV



M
①Coil springs Equivalent of SWOSC—V (Steel Wire Oil Temper Silicon for Valve)
②Holders S45C
S (Holder section) Fe_3O_4(Black oxide)

■Heat resistant 120℃type

D	d	L	D1	P	a	N/mm {kgf/mm}	Solid Height	F=L×25% Fmm	F=L×25% Load N{kgf}	F=L×40% Fmm	F=L×40% Load N{kgf}	Bolt used	Part Number Type	Part Number D−L	U/Price 1～19
16	9	20	15.9	5.2	3	36.8{3.8}	12	5.0	183.8{19}	*7	*279.5{28.5}	M5	WSW (Heat resistant 120℃)	16−20	Quotation
		25				29.4{3.0}	14	6.2		10	294.2{30}			16−25	
		30				24.5{2.5}	16	7.5		12				16−30	
18	11	20	17.9	6.2		42.9{4.4}	12	5.0	214.5{22}	*7	*326.1{33.25}	M6		18−20	
		25				34.3{3.5}	14	6.2		10	343.2{35}			18−25	
		30				28.6{2.9}	17	7.5		12				18−30	
20	11.5	25	19.9			44.1{4.5}	13	6.2	275.6{28}	10	441.3{45}			20−25	
		30				36.8{3.8}	17	7.5		12				20−30	
		35				31.5{3.2}	19	8.7		14				20−35	
		40				27.6{2.8}	21	10		16				20−40	
22	12.7	25	21.9		3.5	53.9{5.5}	14	6.2	337.5{35}	10	539.4{55}			22−25	
		30				45.0{4.6}	16	7.5		12				22−30	
		35				38.5{3.9}	17	8.7		14				22−35	
		40				33.7{3.4}	23	10		16				22−40	
		45				30.0{3.1}	25	11.2		18				22−45	
25	15	30	24.9		4	61.3{6.3}	18	7.5	428.6{44}	12	686.5{70}			25−30	
		35				49.0{5.0}	21	8.7		14				25−35	
		40				42.9{4.4}	22	10		16				25−40	
		45				38.1{3.9}	25	11.2		18				25−45	
		50				34.3{3.5}	27	12.5		20				25−50	
30	17	45	29.9		4.5	43.6{4.4}	25	11.2	490.3{50}	18	784.5{80}			30−45	
		50				39.2{4.0}	27	12.5		20				30−50	
		55				35.7{3.6}	30	13.7		22				30−55	
Durable number of times used								One million times		300,000 times					

Use Fmm* within F=L×35%.　The solid height values are for reference only. There may be some dispersions depending on the lot.　kgf=N×0.101972

■Heat resistant 200℃type

D	d	L	D1	P	a	N/mm {kgf/mm}	Solid Height	F=L×25% Fmm	F=L×25% Load N{kgf}	F=L×30% Fmm	F=L×30% Load N{kgf}	Bolt used	Part Number Type	Part Number D−L	U/Price 1～19
16	9	20	15.9	5.2	3	32.7{3.3}	14	5.0	163.4{17}	Outside allowable range		M5	WSV (Heat resistant 200℃)	16−20	Quotation
		25				26.2{2.7}	16	6.2		7.5	196.1{20}			16−25	
		30				21.8{2.2}	19	7.5		9.0				16−30	
18	11	20	17.9	6.2		39.2{4.0}	14	5.0	196.1{20}	Outside allowable range		M6		18−20	
		25				31.4{3.2}	16	6.2		7.5	235.4{24}			18−25	
		30				26.2{2.7}	19	7.5		9.0				18−30	
20	11.5	25	19.9			39.2{4.0}	16	6.2	245.2{25}	7.5	294.2{30}			20−25	
		30				32.7{3.3}	19	7.5		9.0				20−30	
		35				28.0{2.9}	21	8.7		10.5				20−35	
		40				24.5{2.5}	24	10.0		12.0				20−40	
22	12.7	25	21.9		3.5	49.0{5.0}	16	6.2	306.5{31}	7.5	367.7{38}			22−25	
		30				40.9{4.2}	19	7.5		9.0				22−30	
		35				35.0{3.6}	21	8.7		10.5				22−35	
		40				30.6{3.1}	24	10.0		12.0				22−40	
		45				27.2{2.8}	27	11.2		13.5				22−45	
25	15	30	24.9		4	54.5{5.6}	19	7.5	408.6{42}	9.0	490.3{50}			25−30	
		35				46.7{4.8}	21	8.7		10.5				25−35	
		40				40.9{4.2}	24	10.0		12.0				25−40	
		45				36.3{3.7}	27	11.2		13.5				25−45	
		50				32.7{3.3}	31	12.5		15.0				25−50	
30	17	45	29.9		4.5	41.4{4.2}	27	11.2	465.8{48}	13.5	559.0{57}			30−45	
		50				37.3{3.8}	31	12.5		15.0				30−50	
		55				33.9{3.5}	34	13.8		16.5				30−55	
Durable number of times used								One million times		300,000 times					

The solid height values are for reference only. There may be some dispersions depending on the lot.　kgf=N×0.101972

Order

Part Number
WSW20−35
WSV20−35

Days to Ship Quotation

Price Quotation

■Characteristics

- Spring can easily be installed by a bolt in small spaces.★

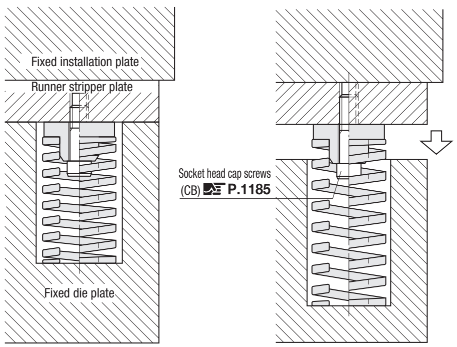
■Note on handling

- Flange part of the spring and holder is press fitted. However, the spring and holder could come off depending on the usage environment. Please refrain from using the spring in an unlocked state.
- Please do not use it with over maximum allowable deflection (F=L×40%). It become easy for the spring and the holder to come off, and it is very dangerous.
- Please use within the allowable temperature.
- Data on load was taken at room temperature (less than 40℃). Although it may vary depending on various conditions, N{kgf} load usually decreases when used in temperature higher than room temperature.

●Load calculation method: Load=Spring constant×Deflection
N=N/mm×Fmm
kgf=kgf/mm×Fmm

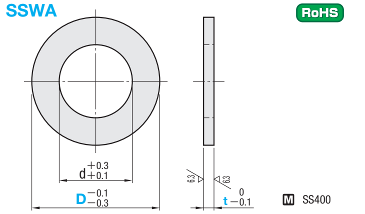
Instructions and notes for coil springs P.1221

Example



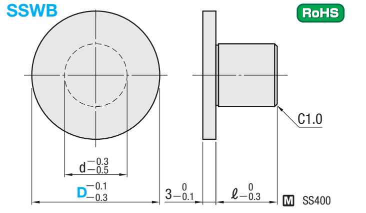
■WASHERS FOR COIL SPRINGS

SSWA



d	Applicable spring dia.	Part Number Type	Part Number D	t	U/Price 1～19 t=1.0	t=2.0	t=3.0	t=4.0	t=5.0
3.0	6	SSWA	5	1.0 2.0 3.0 4.0 5.0	Quotation				
5.0	8		7						
6.0	10		9						
7.0	12		11.5						
8.0	14		13						
9.0	16		15						
10.0	18		17						
12.0	20		19						
12.0	22		21						
14.5	25		24						
15.0	27		26						
17.0	30		29						
20.0	35		34						
23.0	40		39						

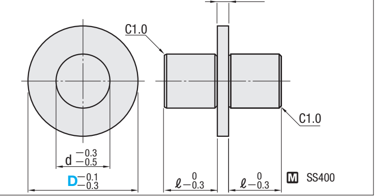
SSWB



d	ℓ	Applicable spring dia.	Part Number Type	Part Number D	U/Price 1～19
3.5	4.0	8	SSWB	7	Quotation
4.5	5.0	10		9	
5.5	6.0	12		11	
6.5	7.0	14		13	
7.5	8.0	16		15	
8.5	9.0	18		17	
9.5	10.0	20		19	
10.5	11.0	22		21	
12.0	12.0	25		24	
13.0	13.0	27		26	
14.5	15.0	30		29	
17.0	17.0	35		34	
19.5	20.0	40		39	

⊗ SWC type not applicable.

SSWC



d	ℓ	Applicable spring dia.	Part Number Type	Part Number D	U/Price 1～19
3.5	4.0	8	SSWC	7	Quotation
4.5	5.0	10		9	
5.5	6.0	12		11	
6.5	7.0	14		13	
7.5	8.0	16		15	
8.5	9.0	18		17	
9.5	10.0	20		19	
10.5	11.0	22		21	
12.0	12.0	25		24	
13.0	13.0	27		26	
14.5	15.0	30		29	
17.0	17.0	35		34	
19.5	20.0	40		39	

⊗ SWC type not applicable.

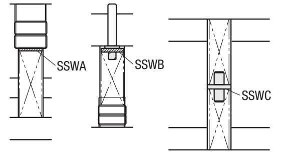
Order

Part Number	—	t
SSWA15	—	2.0
SSWC 9		

Days to Ship Quotation

Price Quotation

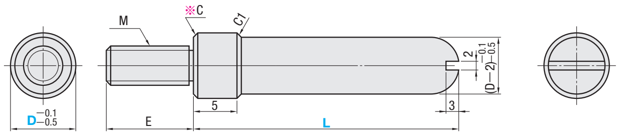
Example



SPRING GUIDE PINS

RoHS

SGAMK



When D=8, 10 ※C is C0.5, When D=12, 15 ※C is C1.

M SK4 (Annealed steel)

M	E	Part Number		L	U/Price 1~19			
		Type	D	10mm increments	L20・30・40	L50・60	L70・80	L90・100
6	10	SGAMK	8	20~ 60	Quotation			
8	10		10	20~ 80				
8	10		12	20~ 80				
10	12		15	20~100				

Order

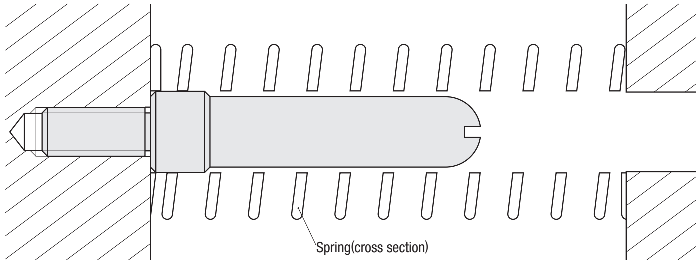
Part Number	—	L
SGAMK10	—	50

Price Quotation

Days to Ship Quotation

■Characteristics This spring guide pin was developed for plastic molding with horizontal application in mind. Its optimum guide diameter (2mm smaller than an applicable spring) as well as annealed steel shaft, can minimize wear on the spring and helps reduce probabilities of spring breakage.
※When using this spring guide pin in the horizontal position, make sure to apply initial deflection.

Example

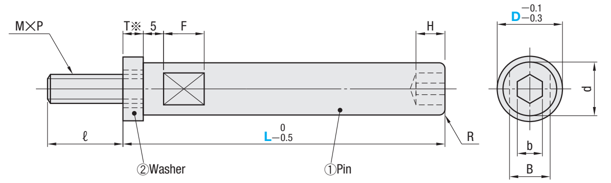


SPRING GUIDE PINS

Non JIS material definition is listed on P.1351 - 1352

RoHS

SGA



※Dimension T changes according to the dimension L.

①② **M** S45C
H 20~25HRC
S Black oxide (Fe_3O_4)

M×P	ℓ	b	H	B	F	R	T	d	Applicable coil		Part Number		L
									Minimal	Other	Type	D	5mm increments
4×0.7	7	3	3	4	8	1	3	6	ϕ14	ϕ14	SGA	7	20~ 50
									ϕ16	ϕ16		8	
5×0.8	8	4	3	6	8	1.5	4	8	ϕ18	ϕ18		9	20~ 75
									—	ϕ20		10	
6×1.0	10	5	4	8	8	2	5	10	ϕ20・22	ϕ22		11	20~ 85
									—	ϕ25		12.5	
8×1.25	17 (12)	6	4	11	10	2.5	5 (10)	13	ϕ25・27	ϕ27		13.5	20~125
									—	ϕ30		15	
									ϕ30	—		16	
10×1.5	20 (15)	8	5	14	12	3	5 (10)	16	—	ϕ35		17.5	30~185
									ϕ35	—		19	
									—	ϕ40		20	
12×1.75	23 (18)	10	6	17	14	3	5 (10)	20	ϕ40	—		22	30~215
									—	ϕ50		25	
									ϕ50	—		27.5	
16×2.0	27 (22)	14	8	22	16	3	5 (10)	25	—	ϕ60		30	50~215
									ϕ60	—		33	

No spanner grooving for L=20 of SGA7~12.5, L=20~25 of SGA13.5~16, and L= 30~35 of SGA17.5~27.5.
For 5mm L (L=25, 35, 45⋯) of SGA13.5~33, T and ℓ dimensions are ( ) as indicated.
Applicable coil springs are indicated by external diameter.

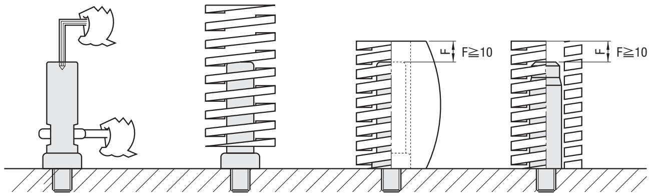
Order

Part Number	—	L
SGA20	—	125

Price Quotation

Days to Ship Quotation

Example



Fasten the pin with an Allen wrench (using a wrench socket on the pin tip) or with a spanner (using relieves on the pin shaft).

Install the spring over a bushing and adjust its position.

Select L size to give an allowance of 10mm or more above the spring guide when it comes at the bottom dead center.

GAS SPRINGS FOR PLASTIC MOLD GUIDE

Features of Gas Springs for Plastic Mold

Generally, gas springs are often used for press mold, and such springs were mostly used as is for plastic mold. MISUMI has developed customized for plastic mold. They have excellent features compared with gas springs up to now.

(1)Heat resistance for use at temperature up to 100℃.

Conventional gas springs are designed for press mold, unsuitable for plastic mold in terms of heat resistance.
MISUMI ensures that the gas springs can be used for plastic mold at 100℃.

Product	MISUMI gas springs for press mold	MISUMI gas springs for plastic Mold
Heatproof temperature	40℃or less <	100℃or less

(2)Longer stroke than conventional gas springs

Long stroke is realized with smaller diameter than conventional gas springs.
MISUMI ensures that the gas springs are compact with long stroke so that they can be used for plastic mold.

Product	MISUMI gas springs for press mold (GSE38) ※ISO type	MISUMI gas springs for plastic mold (MBPGS−A38)
Stroke length	100mm or less <	200mm or less

※The stroke of many commercially available ISO type D38 gas springs is up to 100mm.

(3)Standardized holders for gas springs

Holders used for plastic mold have been manufactured separately for customers, but MISUMI has standardized them.
By purchasing holders together with gas springs, the customer's work and cost can be reduced.

(4)Interchangeability with ISO type
Usable as is for ISO users.

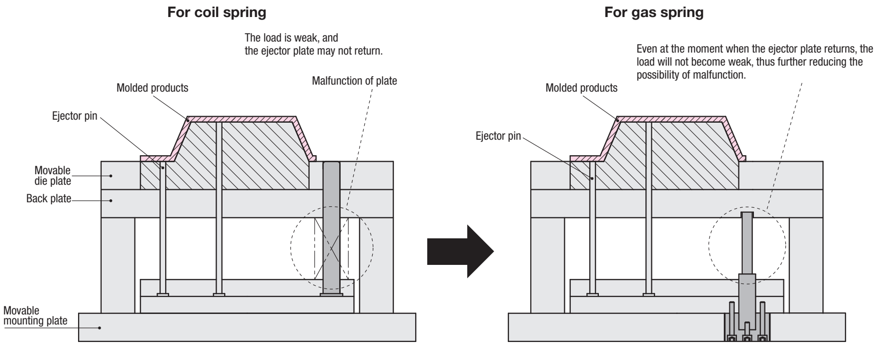
They are interchangeable with gas springs ISO type (GSE of MISUMI products) currently available on the market.
The reason is that the screw hole of the gas spring bottom, body diameter and body length match with ISO type. Users of current ISO type can replace with gas springs for plastic mold without alteration.

※Note that piston rod diameter and body mounting groove, etc. are different from ISO type.

Features

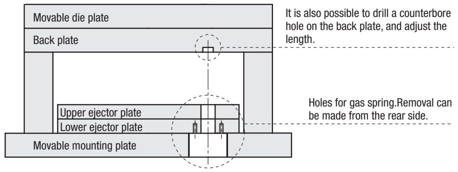
Since nitrogen gas is sealed in the gas springs, large load can be obtained from initial stroke, thus greatly effective in the return of ejector plates.

Coil springs are generally used in the return of ejector plates, but the initial load is low when the ejection stroke is long, and as a result stable load cannot be obtained. These problems can be solved by using gas springs.

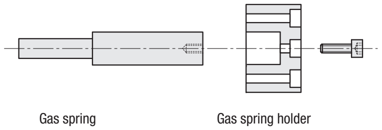

For coil spring
The load is weak, and the ejector plate may not return.
Molded products
Malfunction of plate
Ejector pin
Movable die plate
Back plate
Movable mounting plate
For gas spring
Even at the moment when the ejector plate returns, the load will not become weak, thus further reducing the possibility of malfunction.
Molded products
Ejector pin

How to mount

Step①
Make holes for gas spring on the movable mounting plate and ejector plate (upper and lower) of the mold. (Tapping for holder is also included) It is also possible to make a counterbore hole on the back plate and adjust the length.

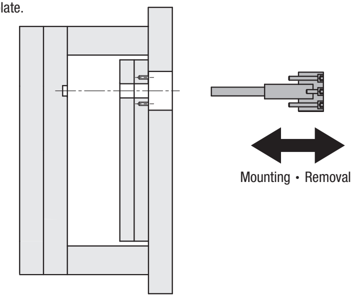

Movable die plate
Back plate
Upper ejector plate
Lower ejector plate
Movable mounting plate
It is also possible to drill a counterbore hole on the back plate, and adjust the length.
Holes for gas spring.Removal can be made from the rear side.

Step②
Mount holder onto gas spring.


Gas spring
Gas spring holder

※Details for combination of gas springs, how to assemble and gas spring holder, see **P.1268**.

Step③
Mounting and removal are possible from the outer side of movable mounting plate.


Mounting・Removal

GAS SPRINGS FOR PLASTIC MOLD　CAUTIONS & WARNINGS

—GUIDE—

■Note on handling for gas spring

When gas springs are used in the following ways, serious accidents like explosion and product failure may result.
Be sure to read the following before use.

■Danger prevention

① Disassembly, welding/cutting, heating and modification are prohibited.
Since high-pressure gas is sealed in, components may fly out.

② Gas re-filling and pressure adjustment are impossible.
Attempt to refill, etc. may cause serious accidents like explosion.

③ Operating temperature (ambient temperature of mold) is 0℃～100℃(32˚F～212˚F).★Use within this temperature range.
Gas springs, when heated to 120℃or more, may cause serious accidents like explosion.
Even serious accidents like explosion are not caused, gas seal may deteriorate due to heat, leading to gas leakage.

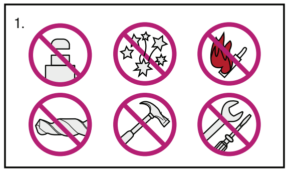
■How to dispose

④ Wear protective glasses and dispose after releasing gas from inside the cylinder.
Make through holes for bolt holes, and dispose after checking that nitrogen gas is completely released.

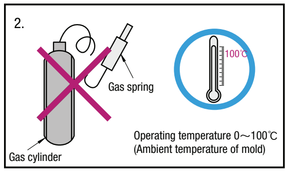
■Gas leakage prevention

⑤ Do not use gas springs in the following ways.
Main trouble like gas leakage may occur.
Moreover, serious accidents like explosion may occur.

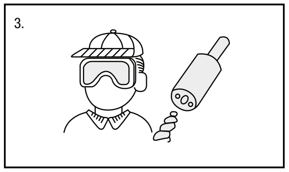
	Usage methods considered problematic	Possible phenomena	Conclusion
a	Oblique or lateral load is applied.	Eccentric load and/or damage	Gas leakage
b	Gas spring is not secured with bolt.		
c	There are no ejector leader pins, or not enough.		
d	Load distribution towards the front, rear, left and right is not uniform inside the mold.		
e	There is obstacle inside the mold, which comes into contact with the gas spring.		
f	Piston rod is not pressed against the "surface".		
g	The"backup plane"piston rod is deformed.		
h	Piston rod is cutting processed.		
i	Welding sputter is adhered to the piston rod.	Seal damage	
j	Facet and metal powder is adhered to the piston rod.		
k	Dent is adhered to the piston rod.		
l	Shot limit is exceeded.		
m	Soaked in lubricating oil.		
n	Moisture, vapour and chemical is applied.		
o	Gas refilling and pressure adjustment.	Reduced durability	Gas leakage and/or explosion, etc.
p	Use at high temperature (100℃or more) or low temperature (0℃or less).		
q	Overstroke		
r	Cylinder is grinded.		
s	Use with piston rod suddenly opened.		
t	Usage and stroage at outdoor or high-temperature & high-humidity places.		
u	Disassembly, welding/cutting, heating and modification of gas spring	Unexpected problems	
v	Assembly into a building or vehicle.		
w	Other unexpected usages (other than for mold)		



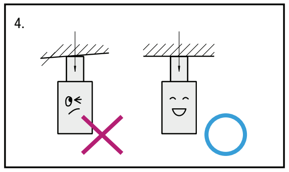
Disassembly, welding/cutting, heating and modification are prohibited.



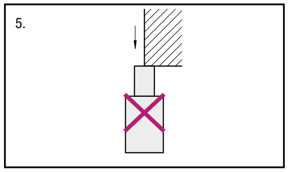
Refilling, pressure adjustment are impossible
Operating temperature is 0～100℃



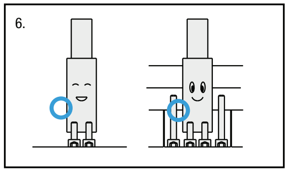
Wear protective glasses and dispose after releasing gas.



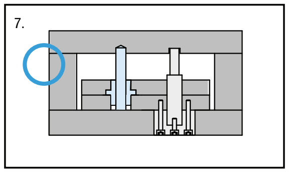
Do not apply oblique or lateral load.



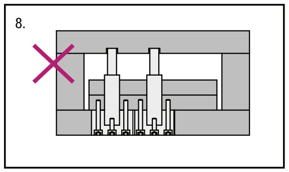
Usage without pressing against the surface is prohibited.



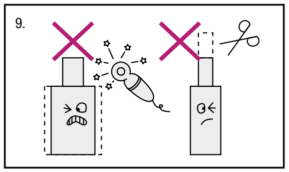
Secure with bolt and holder.



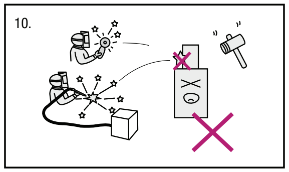
Use ejector leader pins to avoid the occurence of eccentric load.



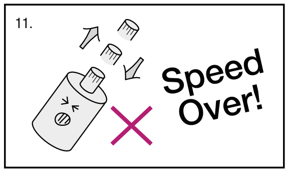
Uniformalize the load.



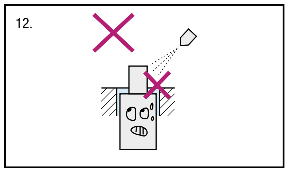
Cylinder grinding and piston rod cutting are prohibited.



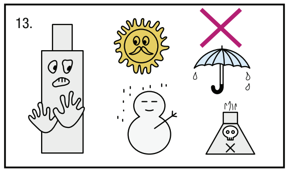
Be careful with the adhesion of welding sputter, facet and metal powder.



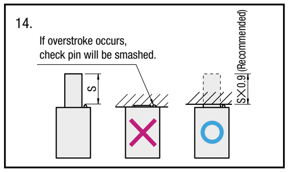
Do not exceed shot limit.



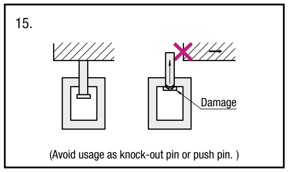
Do not soak in lubricating oil.



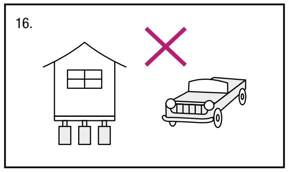
Usage and stroage at outdoor or high-temperature & high-humidity places are prohibited.



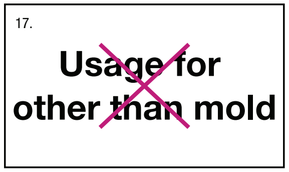
Do not overstroke.



(Avoid usage as knock-out pin or push pin.)



Do not assemble into a building or vehicle.



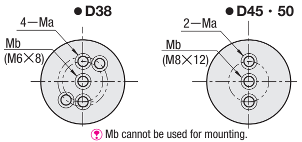
Do not use for other than mold.

GAS SPRINGS FOR PLASTIC MOLD

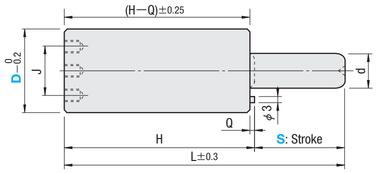
RoHS

MBPGS—A
MBPGS—B

If used outside the stroke range S, gas release occurs and piston rod becomes unable to return. Be sure to use within the stroke range so that it will not come into contact with overstroke check pin.



Mb cannot be used for mounting.



Nitrogen gas sealing pressure		MPa{kgf/cm^2}
MBPGS—A	38	6.4{ 65}
	45	9.2{ 94}
	50	7.8{ 80}
MBPGS—B	38	8.0{ 82}
	45	10.2{104}
	50	9.2{ 94}

Sealing pressure is the value under 20℃.

Cylinder body
M SCM440 comparable
S Fe_3O_4 (Black Oxide)
Temperature to be used: 0～100℃

Piston rod
M SACM645
H 1000HV～(surface)
S Nitriding＋Barrel polishing
A center hole may be left on the tip.

■**Allowable eccentricity**
0.3/100mm

■**Lubrication method**
Oil-free

Weight (kg)	D	d	L	H	Tap for mounting Ma	J	Q	Load N {kgf} [20℃]		Stroke S	Part Number		U/Price
								Initial load	Max. load		Type	D−S	1～9
0.85	38	20	250	150	M6× 8	18 25	2	2000 {204}	2700 {275}	100	MBPGS—A	38—100	Quotation
0.93			300	175						125		38—125	
1.21			370	210						160		38—160	
1.37			450	250						200		38—200	
1.76	45	25	285	185	M8×12	20	2	4500 {459}	6500 {663}	100		45—100	
1.98			335	210						125		45—125	
2.28			405	245						160		45—160	
2.60			485	285						200		45—200	
2.31	50	30	295	195	M8×12	20	3	5500 {561}	8800 {897}	100		50—100	
2.59			345	220						125		50—125	
2.95			415	255						160		50—160	
3.32			495	295						200		50—200	
3.78			595	345						250		50—250	
0.85	38	20	250	150	M6× 8	18 25	2	2500 {255}	3350 {342}	100	MBPGS—B	38—100	
0.93			300	175						125		38—125	
1.21			370	210						160		38—160	
1.37			450	250						200		38—200	
1.76	45	25	285	185	M8×12	20	2	5000 {510}	7250 {739}	100		45—100	
1.98			335	210						125		45—125	
2.28			405	245						160		45—160	
2.60			485	285						200		45—200	
2.31	50	30	295	195	M8×12	20	3	6500 {663}	10400 {1061}	100		50—100	
2.59			345	220						125		50—125	
2.95			415	255						160		50—160	
3.32			495	295						200		50—200	
3.78			595	345						250		50—250	

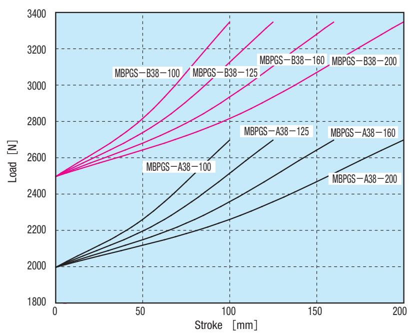
Initial load and max. load are values at 20℃.
- Load{kgf}＝Load N×0.101972 ・Load{N}＝Load kgf×9.80665
- Nitrogen gas sealing pressure kgf/cm^2＝MPa×10.1972 MPa＝kgf/cm^2×0.0980665

Be sure to mount the gas spring for plastic mold with two bolts using the mounting hole of Ma.

In case of D38, the tap for mounting is processed in two pitches, i.e. J18 and J25.

Order	Part Number MBPGS—A 38—125
Days to Ship	Quotation
Price	Quotation

■MBPGS—A/MBPGS—B Load characteristic graph ① D38



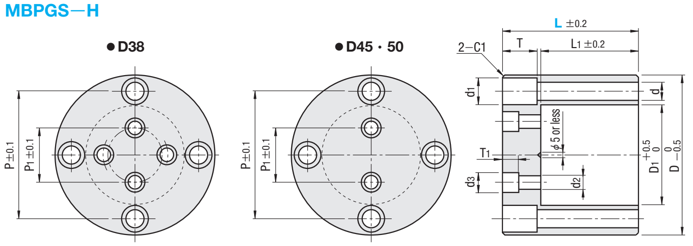
※The above load characteristic graph is the value at 20℃.
When used at 100℃, the load increases by approx. 24%.

HOLDER FOR GAS SPRING

Non JIS material definition is listed on P.1351 - 1352

RoHS

MBPGS—H



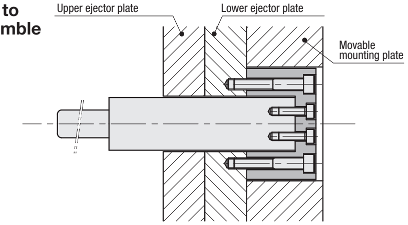
M SS400
S Fe_3O_4 (Black Oxide)

L	L_1	D	D_1	P	d	d_1	T	P_1	d_2	d_3	T_1	A Socket head cap screws		Part Number		L	U/Price
														Type	No.		1～9
40	25	80	40	57	9	14	9	18 25	7	12	7	M 8—35 4	M6—20 ×2	MBPGS—H	38	40	Quotation
50	35											M 8—50 4				50	
55	40											M 8—55 4				55	
45	30	90	47	68	11	17	11	20	9	14	9	M10—45 4	M8—15 ×2		45	45	
55	40											M10—55 4				55	
65	50											M10—65 4				65	
55	40	100	52	75	13	20	13	20	9	14	9	M12—55 4	M8—15 ×2		50	55	
65	50											M12—65 4				65	
75	60											M12—75 4				75	

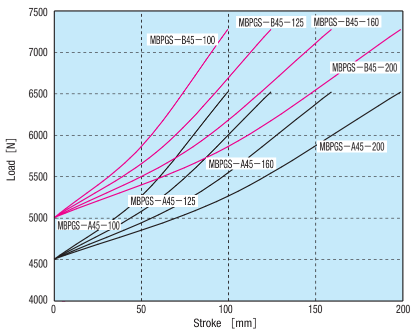
For MBPGS—H38, the bolt hole for mounting gas spring is processed by two pitches: P_1＝18 and P_1＝25.

Order	Part Number MBPGS—H 38—40
Days to Ship	Quotation
Price	Quotation

■How to Assemble

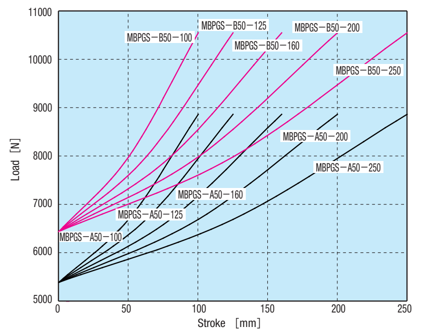


■MBPGS—A/MBPGS—B Load characteristic graph② D45



※The above load characteristic graph is the value at 20℃. When used at 100℃, the load increases by approx. 24%.

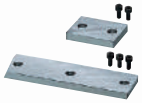
■MBPGS—A/MBPGS—B Load characteristic graph③ D50



※The above load characteristic graph is the value at 20℃. When used at 100℃, the load increases by approx. 24%.

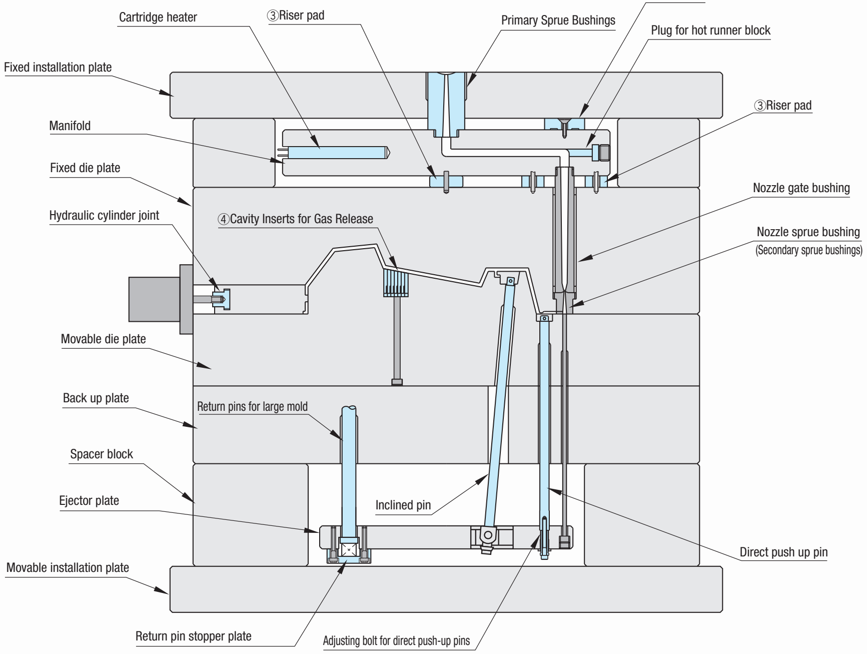
COMPONENTS OF LARGE MOLD

COMPONENTS OF LARGE MOLD



Product Name Part Number	Stopper Plates STPX	Side Cotter Block LKWN	Riser pad RPS□	Cavity Inserts for Gas Release BGV
Page	1271	1272	1273	1275

<Outline for Open Gate Hot Runners>


③Riser pad
Cartridge heater
③Riser pad
Primary Sprue Bushings
Plug for hot runner block
Fixed installation plate
③Riser pad
Manifold
Fixed die plate
Nozzle gate bushing
Hydraulic cylinder joint
④Cavity Inserts for Gas Release
Nozzle sprue bushing
(Secondary sprue bushings)
Movable die plate
Back up plate
Return pins for large mold
Spacer block
Ejector plate
Inclined pin
Direct push up pin
Movable installation plate
Return pin stopper plate
Adjusting bolt for direct push-up pins

No.	Name	Part Number	Page
①	Stopper Plates	STPX	P.1271
②	Side Cotter Block	LKWN	P.1272
③	Riser pad	RPS □	P.1273
④	Cavity Inserts for Gas Release	BGV	P.1275

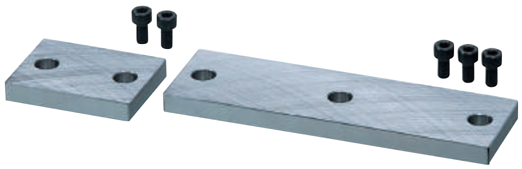
STOPPER PLATES

SIDE COTTER BLOCKS

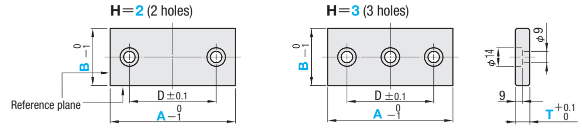
—ANGLE SELECTION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS



STPX

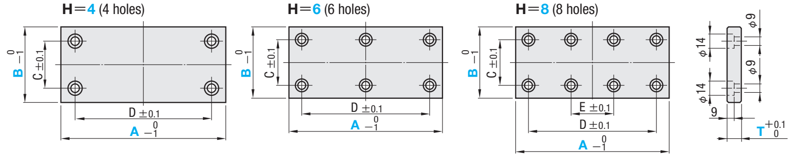


H=2 (2 holes)
H=3 (3 holes)
Reference plane
B -1 0
D ±0.1
A -1 0
φ14
φ9
9
T +0.1 0

Accuracy standard

Parallelism of upper and lower planes	Max. 0.012 per 100mm
Flatness of upper and lower planes	Max. 0.05 per 100mm
Perpendicular of reference plane	Max. 0.015 per 100mm
Aleration of circumferential chamfering	C0.5～C1.0

M S45C **A** Bolt CB8—15×(No. of holes)



H=4 (4 holes)
H=6 (6 holes)
H=8 (8 holes)
B -1 0
C ±0.1
D ±0.1
E ±0.1
A -1 0
φ14
φ9
9
T +0.1 0

C	D	E	Part Number Type	Part Number H	A	B	T	U/Price 1～9 pcs.
—	50	—	STPX	2	80	60	13 15	Quotation
—	120	—		3	150	60		
	170				200			
	220				250			
	270				300			
	370				400			
50	70	—		4	100	80		
	120				150			
	170				200			
	220				250			

C	D	E	Part Number Type	Part Number H	A	B	T	U/Price 1～9 pcs.
70	70	—	STPX	4	100	100	13 15	Quotation
	120				150			
	170				200			
	220				250			
50	120	—		6	150	80		
	170				200			
	220				250			
70	270				300	100		
	370				400			
50	470	160		8	500	80		
70						100		

Order

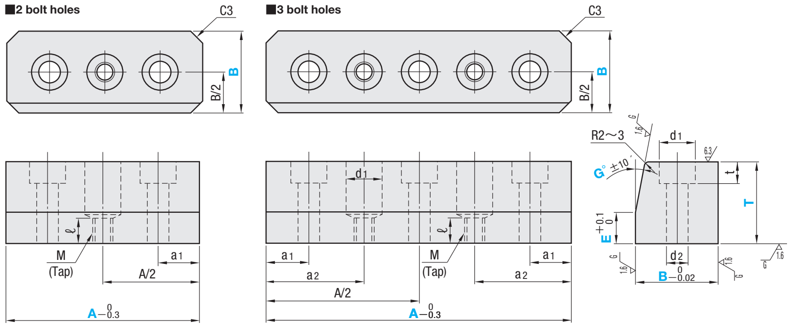
Part Number	—	A	—	B	—	T
STPX8	—	500	—	80	—	T13

Price Quotation

Days to Ship Quotation

RoHS

LKWN



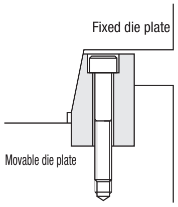
■2 bolt holes
■3 bolt holes
C3
B/2
B
M
(Tap)
ℓ
a1
a2
A/2
d1
d2
A -0.3 0
R2～3
G° ±10
t
T
E +0.1 0
B -0.02 0
6.3
1.6

M S50C
H 38～45HRC

ℓ=M×1

M	d1	d2	t	a1	a2	No. of bolt holes	Part Number Type	Part Number B	T	A	E	G°	U/Price 1～9 pcs.
M6	11	6.6	6.5	10	—	2	LKWN	20	14	60	5	5	Quotation
					25	3				80			
					30					100			
M5	9.5	5.5	6		—	2			29	50 60 80	15		
M6	11	6.6	6.5	15	—	2		25	29	60 80 100	15		
									39	60 80 100			
M8	14	8.6	8.6	15	—	2		30	29	80	10 15		
					32.5	3				100			
					45					150			
					57.5					200			
					70					250			
M10	18	11	11	20	—	2		40	39	100	15	10	
					47.5	3				150			
					60					200			
					72.5					250			
M12	20	13	13	20	—	2		50	44	100	20		
					47.5	3				150			
					60					200			
					72.5					250			

Example



Fixed die plate
Movable die plate

Order

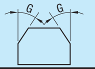
Part Number	—	T	—	A	—	E	—	G
LKWN30	—	29	—	A100	—	E15	—	G5

Price Quotation

Days to Ship Quotation

Alterations

Part Number	—	T	—	A	—	E	—	G	—	(GC)
LKWN30	—	29	—	A100	—	E15	—	G5	—	GC

Alteration	Code	Spec.	1Code
 G G	GC	Tapers on both side (in angle G against B dimension).	Quotation

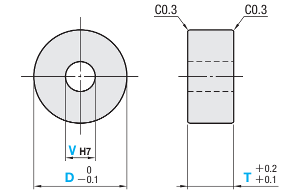
For Heat
Insulation
SUS416

RISER PADS (INSULATION SPACER FOR HOT RUNNER BLOCKS)

Non JIS material definition is listed on P.1351 - 1352

RoHS

RPSK (Dowel pin type)



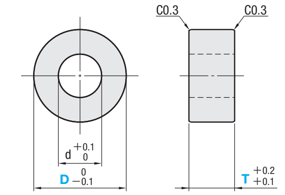
V H7	
8	$^{+0.015}_{0}$
10	
12	$^{+0.018}_{0}$
13	

M SUS416

Part Number Type	D	V	T	U/Price 1~19 pcs.
RPSK	25	8 10	10	Quotation
			15	
			20	
	30	8 10 12	10	
			15	
			20	
	40	10 12 13	10	
			15	
			20	

RoHS

RPSB (Bolt type)



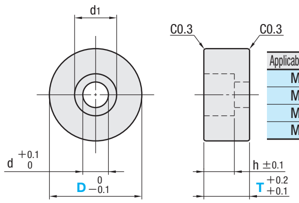
Applicable bolt size	d
M 6	7
M 8	9
M10	11
M12	13
M16	17

M SUS416

Part Number Type	D	M (Applicable bolt size) Selection	T	U/Price 1~19 pcs.
RPSB	25	6 8 10	10	Quotation
			15	
			20	
	30	8 10 12 16	10	
			15	
			20	
	40	8 10 12 16	10	
			15	
			20	

RoHS

RPSZ (Counterbore type)



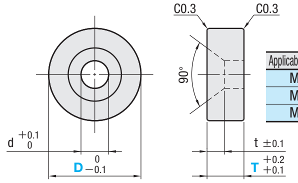
Applicable bolt size	d	d1	h
M 6	6.2	11	6.5
M 8	8.2	14	8.6
M10	10.2	17.5	10.8
M12	12.2	20	13

M SUS416

Part Number Type	D	M (Applicable bolt size) Selection	T	U/Price 1~19 pcs.
RPSZ	25	6	10	Quotation
			15	
			20	
	30	6	10	
			15	
			20	
		8 10	15	
			20	
	40	6	10	
			15	
			20	
		8 10	15	
			20	
		12	20	

RoHS

RPST (For flat head screw)



Applicable bolt size	d	t
M 6	6.2	3.5
M 8	8.2	4.6
M10	10.2	5.7

M SUS416

Part Number Type	D	M (Applicable bolt size) Selection	T	U/Price 1~19 pcs.
RPST	30	6 8	10	Quotation
			15	
			20	
	40	6 8 10	10	
			15	
			20	

Order

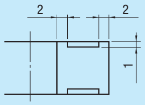
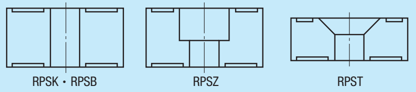
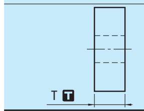
Part Number	—	V · M	—	T
RPSK 30	—	V12	—	T15
RPSB 40	—	M12	—	T20

Days to Ship Quotation

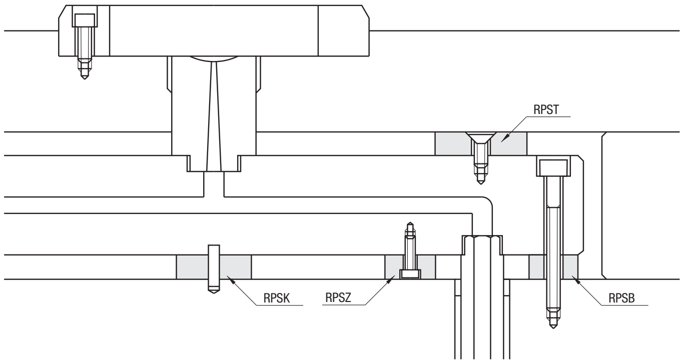
Price Quotation

Alterations

Part Number	—	V · M	—	T	—	(MK · TK1 · TK2 · TK3)
RPSZ30	—	M8	—	T15	—	MK

Alterations	Code	Spec.	1Code
	MK	Adds a groove on both sides in order to facilitate insulation.  ⊗ Express service not available The remains of processing may remain in the bottom of slot processing.	Quotation
	TK1 TK2 TK3	Changes T dimension tolerance. Code: T TK1: $^{+0.02}_{0}$ TK2: ±0.01 TK3: $^{0}_{-0.02}$ For 1 order of 20 pieces or less, we will grind them simultaneously. (Although T dimension tolerance is as stated in the left table, variation will be limited within 0.01.)	

Example



Material	Heat transmission rate [cal／cm · sec · ℃] (100℃)	Heat expansion coefficient [×10^{-6}／℃] (100℃)
SUS416	0.058	9.9
S50C	0.120	11.5

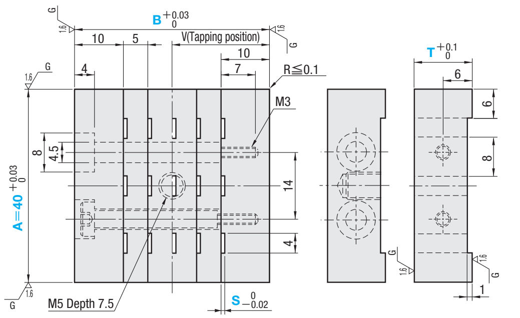
1cal／cm · sec · ℃＝418.6W／(m · k)

CAVITY INSERTS FOR GAS RELEASE

Non JIS material definition is listed on P.1351 - 1352

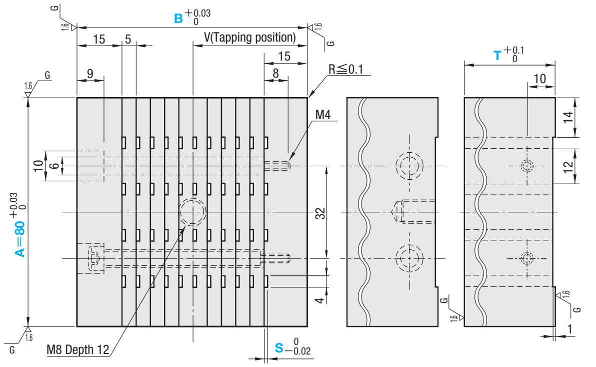
BGV RoHS

A=40



B $^{+0.03}_{0}$
10
5
V(Tapping position)
10
7
4
R≦0.1
M3
8
4.5
A=40 $^{+0.03}_{0}$
14
4
T $^{+0.1}_{0}$
6
6
8
1
G
1.6
M5 Depth 7.5
S $^{0}_{-0.02}$

A=80



B $^{+0.03}_{0}$
15
5
V(Tapping position)
15
9
8
R≦0.1
M4
10
6
A=80 $^{+0.03}_{0}$
32
4
T $^{+0.1}_{0}$
10
14
12
1
G
1.6
M8 Depth 12
S $^{0}_{-0.02}$

■Precision Standard

- Squareness for A・B surfaces 0.02mm or less for 100mm
- Parallel accuracy of upper and lower surfaces 0.02mm or less for 100mm

M S50C
A 2 Shoulder bolts (MSB)

V	Number of plates	No. of grooves	**A** Supplied bolts	Part Number			T	S
				Type	A	B		
20	6	15	MSB4.5−25	BGV	40	40	12 20 40	0.03 0.05
25	8	21	MSB4.5−35			50		
30	10	27	MSB4.5−45			60		
30	8	28	MSB6 −35		80	60	60 80	
35	10	36	MSB6 −45			70		
40	12	44	MSB6 −55			80		

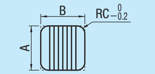
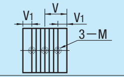
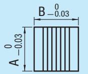
Order Part Number − T − S
BGV8070 − 60 − S0.05

Price Quotation

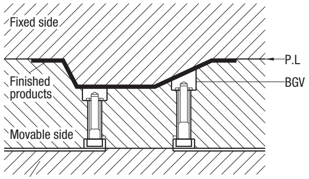
Days to Ship Quotation

Alterations Part Number − T − S − (RC・MC・CMK)
BGV8070 − 60 − S0.05 − RC10−MC−CMK

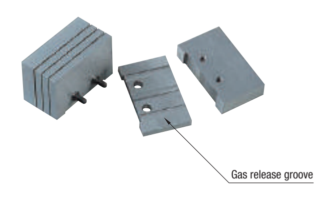
Quotation

Alterations	Code	Spec.	1Code
	RC	Machines R-chamfering at 4 corners on A・B surfaces whose R≦0.1. A / RC (Selection) 40 / 3, 5 80 / 5, 10	Quotation
	MC	Makes the number of tap hole 3. A / V_1 / M 40 / 10 / M5 Depth 7.5 80 / 7.5 / M8 Depth 12	
	CMK	Changes the tolerance of A dimension and B dimension. A $^{+0.03}_{0}$ …→ A $^{0}_{-0.03}$ B $^{+0.03}_{0}$ B $^{0}_{-0.03}$	

Example

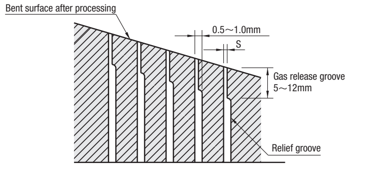


Fixed side
P.L
BGV
Finished products
Movable side
Backing plates



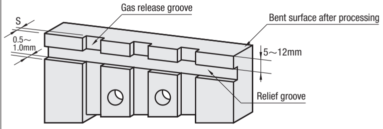
Gas release groove

Figure 1



Bent surface after processing
0.5∼1.0mm
S
Gas release groove 5∼12mm
Relief groove

Example 1. Machining a relief groove on existing gas release groove.



Gas release groove
Bent surface after processing
S
0.5∼1.0mm
5∼12mm
Relief groove

Example 2. Machining a relief groove on each plate parallel to bent surface.

Figure 2: Cavity Inserts for Gas Release Example of relief groove addition

■Characteristics

- ●Gas release groove (S) is processed on each plate. Specific number of each plate is combined to make gas release cavity insert block. (Figure 1)
- ●Since each plate is fixed only with a shoulder bolt (MSB), plugging by resin or tar can easily be removed by disassembling during maintenance.
- ●Gas as well as air is released from 0.03 or 0.05mm groove, lowering flow resistance and facilitating molding.
- ●It can be processed on bent surface to suit the shape of finished product. (See Example)
- ●Effective in relieving gas at time of mold processing in middle to large size molds.

■How to mount

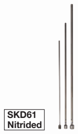
1. Insert where gas is apt to collect such as final filling section.
2. Process bent surface to suit product type as necessary.
3. We recommend addition of relief groove in order to decrease resin plugging in gas release groove. Ideally, a relief groove should be added by alteration of 0.5∼1.0mm thickness after leaving approximately 5∼12mm of gas release groove section. (Figure 2)
4. A/B dimension tolerance are positive. Insert into mold by actual fitting process.
5. A tap hole is added on the bottom of cavity insert. It is for fixing the insert. (See Example)

■Note on handling

1. Select 0.03 for groove depth when resin has a high fluidity, and 0.05 when resin has a low fluidity.
2. Be sure to identify bolt hole and tap hole on the inside of cavity insert in the blueprint when processing bent surface, so that it will not create any problem.
3. Note that tapering process on bent surface enlarges the groove area and may cause plugging.
4. Please be careful about mounting position since shape of the groove may appear on the finished product depending on the groove width and resin.
5. This product achieves dimensional precision by performing the final machining in shape of block which is a combination of each plate with gas release groove. Be sure to reassemble in original order if you happen to disassemble it. You can identify the correct order by the 0.1mm depth V groove in angled direction on the bottom of insert. Slight imbalance may occur by precision error in shoulder bolt and hole. Thus assembly should be done on a flat surface with dimension fitting.
6. Each plate for this product is a raw material. Note that it will be damaged if struck with hard object.

COMPONENTS OF DIE CASTING

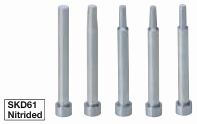
COMPONENTS OF DIE CASTING


SKD61
Nitrided

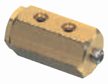
SKD61
Nitrided

SKD61
Nitrided

SKD61
Nitrided

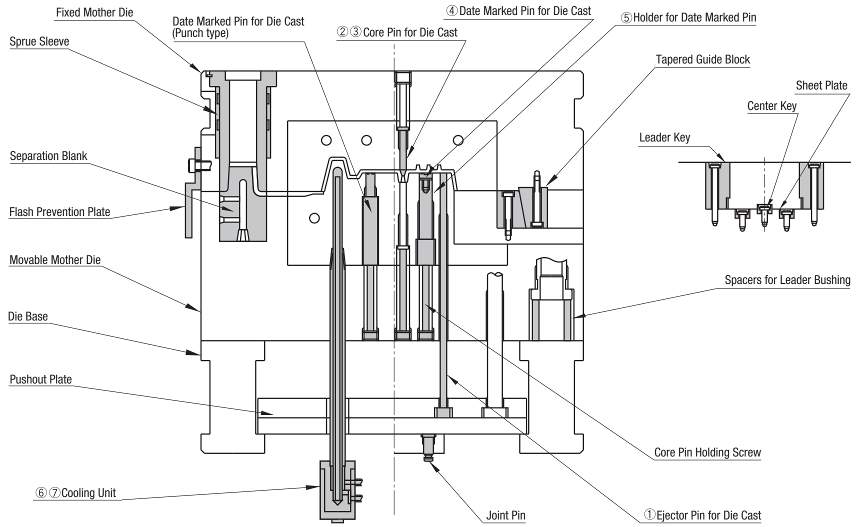

SKD61
Nitrided

Product Name Part Number	Straight Ejector Pins for Die Cast DEP	DEPL	DEPB	Stepped Ejector Pins for Die Cast DESF	Ejector Sleeves for Die Cast DESL	Core Pins for Die Cast —Shaft diameter (D) selection type—	—Shaft diameter (P) designation type—
Page	1279	1281	1281	1283	1285	1287	1289



Date Marked Pins for Die Cast DDMX	DDM□	CDMX	CDM□	Holder for Date Marked Pins—Small diameter type— CDH	Cooling Units DCJK	Pipes for Cooling Unit DCJO	DCJI	Burr Cutting Pins DCP□
1291	1291	1291	1291	1292	1293	1294	1294	1295

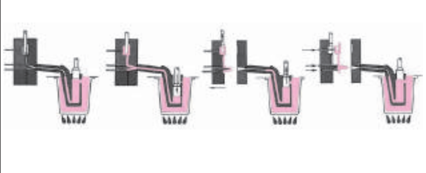
DIE CAST PARTS —GUIDE—


Fixed Mother Die
Sprue Sleeve
Date Marked Pin for Die Cast (Punch type)
④Date Marked Pin for Die Cast
②③Core Pin for Die Cast
⑤Holder for Date Marked Pin
Tapered Guide Block
Sheet Plate
Center Key
Leader Key
Separation Blank
Flash Prevention Plate
Movable Mother Die
Spacers for Leader Bushing
Die Base
Pushout Plate
Core Pin Holding Screw
⑥⑦Cooling Unit
Joint Pin
①Ejector Pin for Die Cast

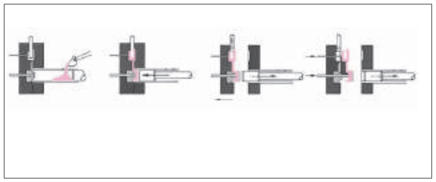
Product classification	No.	Name	Part Number	Page
Ejector Pins, Ejector Sleeves, Core Pins, etc.	①	Ejector Pins for Die Cast	DEP・DEPL etc	P.1279～1284
	—	Straight Ejector Pin Sleeves for Die Cast	DESL	P.1285
	②	Core Pins for Die Cast —Shaft diameter (D) selection type—	DSPDL・DS□ etc	P.1287
	③	Core Pins for Die Cast —Shaft diameter (P) designation type—	DSPB・DSB□ etc	P.1289
	④	Date Marked Pins for Die Cast	DDM□・CDM□	P.1291
	⑤	Holder for Date Marked Pins	CDH	P.1292
Related to Cooling	⑥	Cooling Units	DCJK	P.1293
	⑦	Pipes for Cooling Units	DCJO・DCJI	P.1294
Parts for Trim	⑧	Burr Cutting Pins for Trim	DCP□	P.1295

■ Principle of Die Cast

Hot Chamber Die Cast Method



Cold Chamber Die Cast Method



(From "Introduction to Die Cast" by Japan Association of Die Cast Manufactures)

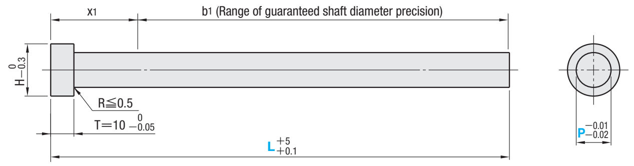
Dies Steel
SKD61 equivalent
+
Nitrided

STRAIGHT EJECTOR PINS FOR DIE CAST

—BLANK TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number	Head Thickness
DEP (Blank type)	10mm (T10)

Range of guaranteed shaft diameter precision (Details ☞ **P.1301**)
x1 max.=40
M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40~45HRC
Range of guaranteed base material hardness (Details ☞ **P.1303**)
Range of guaranteed surface hardness for nitriding (Details ☞ **P.1303**)

H	Part Number		L											
	Type	P	(Selection)											
8	DEP	4	100	150	200	250	300	350	400	500	600			
9		5	100	150	200	250	300	350	400	500	600			
10		6	100	150	200	250	300	350	400	500	600	700		
11		7	100	150	200	250	300	350	400	500	600	700	800		
13		8	100	150	200	250	300	350	400	500	600	700	800		
15		10	100	150	200	250	300	350	400	500	600	700	800		
17		12		150	200	250	300	350	400	500	600	700	800		
20		15		150	200	250	300	350	400	500	600	700	800	900	1000
25		20		150	200	250	300	350	400	500	600	700	800	900	1000

Order

Part Number	—	L
DEP6	—	300

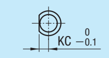
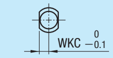
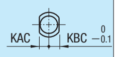
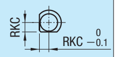
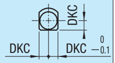
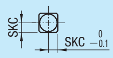
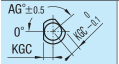
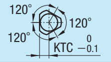
Days to Ship **Quotation**

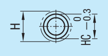
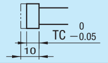
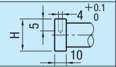
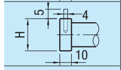
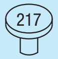
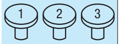
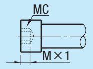
Alterations

Part Number	—	L	—	(KC・WKC…etc.)
DEP5	—	200	—	TC6.0

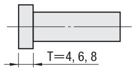
Quotation

Alteration details ☞ P.53

Alterations	Code	Spec.	1Code
	**KC**	KC=0.1mm increments P/2≦KC<H/2	Quotation
	**WKC**	WKC=0.1mm increments P/2≦WKC<H/2	
	**KAC** **KBC**	KAC, KBC=0.1mm increments P/2≦KAC<KBC<H/2	
	**RKC**	RKC=0.1mm increments P/2≦RKC<H/2	
	**DKC**	DKC=0.1mm increments P/2≦DKC<H/2	
	**SKC**	SKC=0.1mm increments P/2≦SKC<H/2	
	**KGC**	KGC=0.1mm increments AG=1° increments P/2≦KGC<H/2, 0<AG<360	
	**KTC**	KTC=0.1mm increments P/2≦KTC<H/2	

Alterations	Code	Spec.	1Code
	**HC**	HC=0.1mm increments P+1≦HC<H	Quotation
	**TC**	TC=0.1mm increments 5.0≦TC<10 Dimension L becomes shorter by (10−TC)	
	**NC**	Dowel hole boring Combination with other than NHC・NHN not available.	
	**NCW**	Dowel hole boring+Spring pin driving Combination with other than NHC・NHN not available.	
	**NHC**	Numbering on the head How to order ☞ **P.54** Combination with SKC not available.	
	**NHN**	Automatic sequential numbering on the head How to order ☞ **P.54** Combination with SKC not available.	
	**MC**	Head tapping Available when P≧8 Combination with any other alteration not available P: 8, 10, 12・15, 20 M: M4, M5, M6, M8	

Price **Quotation**



Head thickness JIS type ☞ P.69

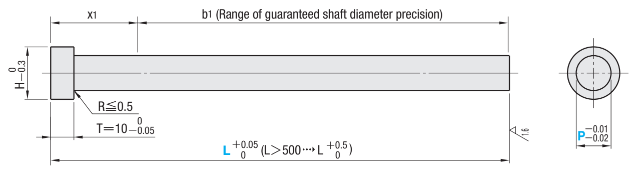
Dies Steel
SKD61 equivalent
＋
Nitrided

STRAIGHT EJECTOR PINS FOR DIE CAST

—L DIMENSION DESIGNATION TYPE／L・P DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS


x1
b1 (Range of guaranteed shaft diameter precision)
H $_{-0.3}^{0}$
R≦0.5
T=10 $_{-0.05}^{0}$
L $_{0}^{+0.05}$ (L>500···L $_{0}^{+0.5}$)
1.6
P $_{-0.02}^{-0.01}$

Part Number	Head Thickness
DEPL (L dimension designation type)	10mm (T10)
DEPB (L・P dimension designation type)	

Range of guaranteed shaft diameter precision (Details P.1301)
x1 max.=40
M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40～45HRC
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

■L Dimension Designation Type

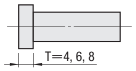
H	Part Number		L	
	Type	P	0.01mm increments	0.1mm increments
8	DEPL	4	50.00～500.00	500.1～ 600.0
9		5		
10		6		500.1～ 700.0
11		7		500.1～ 800.0
13		8		
15		10		
17		12		500.1～1000.0
20		15		
25		20		

L≦500.00 ··· 0.01mm increments, L>500 ··· 0.1mm increments

■L・P Dimension Designation Type

H	Part Number		0.01mm increments	
	Type	No.	L	P
8	DEPB	4	50.00～300.00	3.00～ 3.99
9		5		4.00～ 4.99
10		6		5.00～ 5.99
11		7		6.00～ 6.99
13		8		7.00～ 7.99
15		10		8.00～ 9.99
17		12		10.00～11.99
20		15		12.00～14.99
25		20		15.00～19.99

Nitriding may extend to the head as it is applied after dimension P machining.



Head thickness JIS type P.71～76

Order

Part Number	—	L	—	P
(L dimension designation type) DEPL 5	—	270.50		
(L・P dimension designation type) DEPB 5	—	268.30	—	P4.53

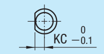
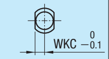
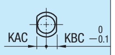
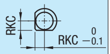
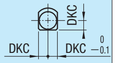
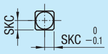
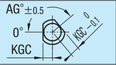
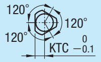
Days to Ship Quotation

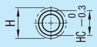
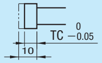
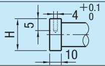
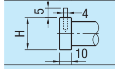
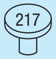
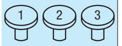
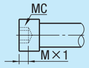
Alterations

Part Number — L — P — (KC・WKC···etc.)
DEPB5 — 268.30 — P4.53 — TC6.0

Quotation

Alteration details P.53

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments KC=P/2 ··· 0.005mm increments possible P/2≦KC<H/2	Quotation
	WKC	WKC=0.1mm increments WKC=P/2 ··· 0.005mm increments possible P/2≦WKC<H/2	
	KAC KBC	KAC, KBC=0.1mm increments KAC=P/2 ··· 0.005mm increments possible P/2≦KAC<KBC<H/2	
	RKC	RKC=0.1mm increments RKC=P/2 ··· 0.005mm increments possible P/2≦RKC<H/2	
	DKC	DKC=0.1mm increments DKC=P/2 ··· 0.005mm increments possible P/2≦DKC<H/2	
	SKC	SKC=0.1mm increments SKC=P/2 ··· 0.005mm increments possible P/2≦SKC<H/2	
	KGC	KGC=0.1mm increments KGC=P/2 ··· 0.005mm increments possible AG=1° increments P/2≦KGC<H/2, 0<AG<360	
	KTC	KTC=0.1mm increments KTC=P/2 ··· 0.005mm increments possible P/2≦KTC<H/2	

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments P+1≦HC<H	Quotation
	TC	TC=0.1mm increments 5.0≦TC<10 (Dimension L remains unchanged.) 10−TC≦L max.−L	
	NC	Dowel hole boring ⊗ Combination with other than NHC・NHN not available.	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN not available.	
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	MC	Head tapping Available when P≧8.00 ⊗ Combination with any other alteration not available P / M P 8.00～ 9.99 / M4 P10.00～11.99 / M5 P12.00～15.99 / M6 P16.00～20.00 / M8	

Price Quotation

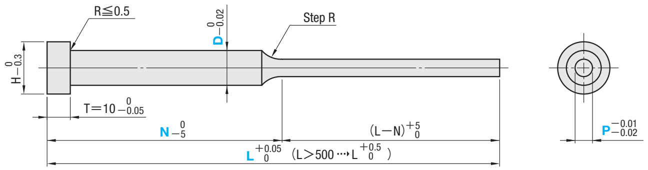
Dies Steel
SKD61 equivalent
+
Nitrided

STEPPED EJECTOR PINS FOR DIE CAST

—L・P DIMENSION DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS



Part Number	Head Thickness
DESF	10mm (T10)

Range of guaranteed shaft diameter precision (Details P.1301)
Step R (Details P.1302)
M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40~45HRC
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

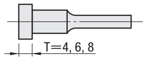
H	Part Number		L		P	N
	Type	D	0.01mm increments	0.1mm increments	0.01mm increments	1mm increments
8	DESF	4	50.00~500.00	500.1~600.0	1.50~ 3.90	N≧30 and 15≦(L−N)≦300
9		5			3.00~ 4.90	
10		6		500.1~700.0	4.00~ 5.90	
11		7		500.1~800.0	4.90~ 6.90	
13		8			5.90~ 7.90	
15		10			7.90~ 9.90	
17		12			8.90~11.90	
20		15			10.90~14.90	
25		20			15.90~19.90	

L≦500.00 ⋯▸ 0.01mm increments, L 500 ⋯▸ 0.1mm increments
DESF: Nitriding may extend to the head as it is applied after dimension P machining.

Order

Part Number	—	L	—	P	—	N
DESF5	—	268.30	—	P3.01	—	N45

Days to Ship Quotation

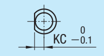
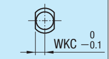
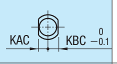
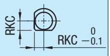
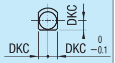
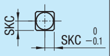
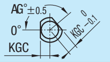
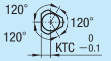


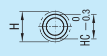
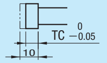
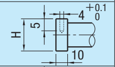
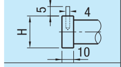
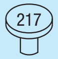
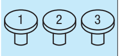
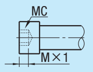
Head thickness JIS type P.151

Alterations

Part Number	—	L	—	P	—	N	—	(KC・WKC⋯etc.)
DESF10	—	720.5	—	P9.00	—	N300	—	SKC7.0

Alteration details P.53

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments D/2≦KC<H/2	Quotation
	WKC	WKC=0.1mm increments D/2≦WKC<H/2	
	KAC KBC	KAC, KBC=0.1mm increments D/2≦KAC<KBC<H/2	
	RKC	RKC=0.1mm increments D/2≦RKC<H/2	
	DKC	DKC=0.1mm increments D/2≦DKC<H/2	
	SKC	SKC=0.1mm increments D/2≦SKC<H/2	
	KGC	KGC=0.1mm increments AG=1° increments D/2≦KGC<H/2, 0<AG<360	
	KTC	KTC=0.1mm increments D/2≦KTC<H/2	

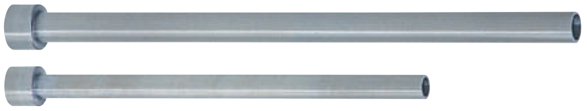
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D+1≦HC<H	Quotation
	TC	TC=0.1mm increments 5.0≦TC<10 (Dimensions L and N remain unchanged) 10−TC≦L max.−L	
	NC	Dowel hole boring ⊗ Combination with other than NHC・NHN not available.	
	NCW	Dowel hole boring+Spring pin driving ⊗ Combination with other than NHC・NHN not available.	
	NHC	Numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	NHN	Automatic sequential numbering on the head How to order P.54 ⊗ Combination with SKC not available.	
	MC	Head tapping Available when D≧8 ⊗ Combination with any other alteration not available. D: 8 – M: M4 D: 10 – M: M5 D: 12・15 – M: M6 D: 20 – M: M8	

Price Quotation

Die Cast Parts

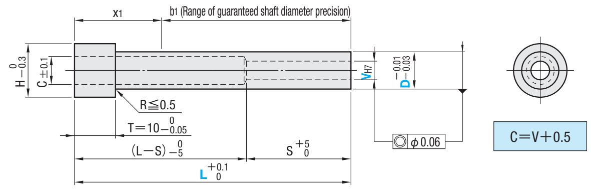
Dies Steel
SKD61 equivalent
+
Nitrided

STRAIGHT EJECTOR SLEEVES FOR DIE CAST



RoHS

Part Number	T V	Applicable center pin shaft diameter tolerance
DESL	H7	−0.01 −0.02 (Details P.1309)



T D

D≦10	D=12
−0.01 −0.02	−0.01 −0.03

T VH7

V≦3.0	3.5≦V≦6.0	V≧6.5
+0.010 0	+0.012 0	+0.015 0

L	50.0~100.0	100.1~150.0	150.1~200.0	200.1~250.0	250.1~300.0
S	30	40	50	60	70

❗ Note that the Stepped Center Pin's shaft diameter (D) is too large to fit in the recess (C) of DESL. (Details P.1310)

M SKD61 equivalent+Nitrided
H Surface 900HV
Base material 40±3HRC
b1 (Range of guaranteed shaft diameter precision) (Details P.1301)
x1 max.=40
Range of guaranteed base material hardness (Details P.1303)
Range of guaranteed surface hardness for nitriding (Details P.1303)

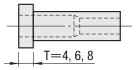
H	Part Number		L	V
	Type	D	0.1mm increments	0.5mm increments
10	DESL	6	50.0~250.0	2.5~ 4.0
13		8		2.5~ 6.0
15		10	50.0~300.0	2.5~ 8.0
17		12		3.0~10.0

❗ DESL: Nitriding may extend to the head as it is applied after dimension V machining.

Order

Part Number	—	L	—	V
DESL8	—	200.1	—	V 4.5

Days to Ship **Quotation**



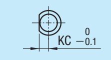
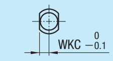
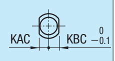
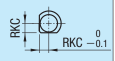
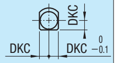
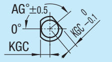
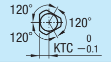
Head thickness JIS type P.305・309・313

❗ Non JIS material definition is listed on P.1351 - 1352

Alterations

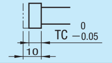
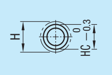
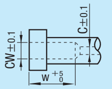
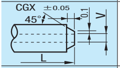
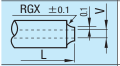
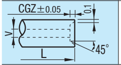
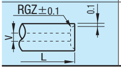
Part Number	—	L	—	V	—	(KC・WKC···etc.)
DESL8	—	200.1	—	V 4.0	—	KC 4.5

Days to Ship **Quotation**

Alterations	Code	Spec.	1Code
	**KC**	KC=0.1mm increments ❗ D/2≦KC<H/2	Quotation
	**WKC**	WKC=0.1mm increments ❗ D/2≦WKC<H/2	
	**KAC** **KBC**	KAC, KBC=0.1mm increments ❗ D/2≦KAC<KBC<H/2	
	**RKC**	RKC=0.1mm increments ❗ D/2≦RKC<H/2	
	**DKC**	DKC=0.1mm increments ❗ D/2≦DKC<H/2	
	**KGC**	KGC=0.1mm increments AG=1° increments ❗ D/2≦KGC<H/2, 0<AG<360	
	**KTC**	KTC=0.1mm increments ❗ D/2≦KTC<H/2	

Price **Quotation**

Alteration details P.53

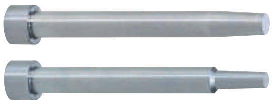
Alterations	Code	Spec.	1Code
	**TC**	TC=0.1mm increments ❗ 5.0≦TC<10, 10−TC≦L max.−L ❗ Dimensions L and (L−S) remain unchanged.	Quotation
	**HC**	HC=0.1mm increments ❗ D≦HC<H ❗ In relation to the head diameter tolerance, alteration may create a straight piece with little diameter difference between the head and shaft.	
	**CW**	Two-step recessing (Makes recess C into two-step and widens it) CW=0.1mm increments W=5mm increments ❗ V+1.0≦CW≦V max.+0.5 ❗ 10≦W≦L−S−10, W≦200	
	**CGX**	CGX=0.1mm increments ❗ 0.2≦CGX≦1.5 and CGX≦ $\frac{D-V}{2}-0.1$ ⊗ Combination with RGX/CGZ/RGZ not available.	
	**RGX**	RGX=0.1mm increments ❗ 0.3≦RGX≦1.5 and RGX≦ $\frac{D-V}{2}-0.1$ ⊗ Combination with CGX/CGZ/RGZ not available.	
	**CGZ**	CGZ=0.1mm increments ❗ 0.2≦CGZ≦1.0 and CGZ≦ $\frac{D-V}{2}-0.1$ ⊗ Combination with CGX/RGX/RGZ not available.	
	**RGZ**	RGZ=0.1mm increments ❗ 0.5≦RGZ≦1.0 and RGZ≦ $\frac{D-V}{2}-0.1$ ⊗ Combination with CGX/RGX/CGZ not available.	

Dies Steel
SKD61 equivalent
+
Nitrided

DIE CAST CORE PINS

—SHAFT DIAMETER (D) SELECTION TYPE—

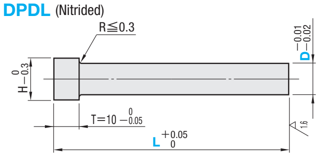
❓ Non JIS material definition is listed on P.1351 - 1352



RoHS

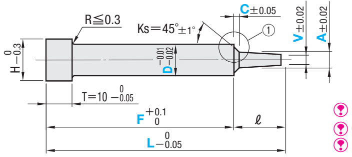
Part Number	M	S	H
DSPDL	SKD61 equivalent (DAC)	—	48±2HRC
DS□			
DPDL		Nitrided	Surface 900HV～ Base metal 48±2HRC
DPD□			

DSPDL
DPDL (Nitrided)


R≦0.3
D $^{-0.01}_{-0.02}$
H $^{0}_{-0.3}$
T=10 $^{0}_{-0.05}$
L $^{+0.05}_{0}$
1.6

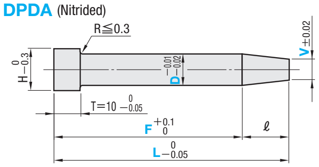
DSD
DPDD (Nitrided)

Select DSC・DPDC when $C=\frac{D-A}{2}$


R≦0.3
Ks=45°±1°
C±0.05
①
V±0.02
A±0.02
D $^{-0.01}_{-0.02}$
H $^{0}_{-0.3}$
T=10 $^{0}_{-0.05}$
F $^{+0.1}_{0}$
ℓ
L $^{0}_{-0.05}$

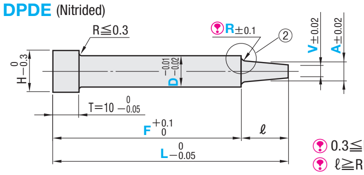
❓ $C<\frac{D-A}{2}$
❓ $0.1\leqq C\leqq 1.5$
❓ $\ell\geqq C+1.0$

DSA
DPDA (Nitrided)


R≦0.3
V±0.02
D $^{-0.01}_{-0.02}$
H $^{0}_{-0.3}$
T=10 $^{0}_{-0.05}$
F $^{+0.1}_{0}$
ℓ
L $^{0}_{-0.05}$

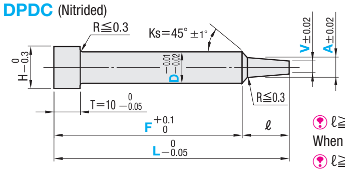
❓ $\ell\geqq 1.0$

DSE
DPDE (Nitrided)


R≦0.3
❓R±0.1
②
V±0.02
A±0.02
D $^{-0.01}_{-0.02}$
H $^{0}_{-0.3}$
T=10 $^{0}_{-0.05}$
F $^{+0.1}_{0}$
ℓ
L $^{0}_{-0.05}$

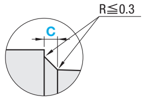
❓ $0.3\leqq R\leqq\frac{D-A}{2}$
❓ $\ell\geqq R+1.0$

DSC
DPDC (Nitrided)

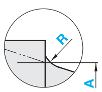

R≦0.3
Ks=45° ±1°
V±0.02
A±0.02
D $^{-0.01}_{-0.02}$
H $^{0}_{-0.3}$
R≦0.3
T=10 $^{0}_{-0.05}$
F $^{+0.1}_{0}$
ℓ
L $^{0}_{-0.05}$

❓ $\ell\geqq\frac{D-A}{2}+1.0$
When AC code is used
❓ $\ell\geqq\frac{D-A}{2\tan AC}+1.0$

Details of part ①



Details of part ②



H	Part Number		0.01mm increments				0.1mm increments	ℓmax.
	Type	D	L	F	A	Vmin.	C・R	
8	(No Nitrided) **DSPDL** **DSA** **DSC** **DSD** **DSE**	4	30.00 ～ 200.00	F≧10.00 No need to designate F, A, V, when DSPDL, DPDL are selected	D＞A≧V No need to designate A when DSA, DPDA are selected	1.00	$0.1\leqq C\leqq 1.5$ and $C<\frac{D-A}{2}$ (DSD DPDD) $R\geqq 0.3$ and $R\leqq\frac{D-A}{2}$ (DSE DPDE)	45.00
9		5				1.50		50.00
10		6				2.00		
13		8						
15		10						
17	(Nitrided) **DPDL** **DPDA** **DPDC** **DPDD** **DPDE**	12				2.50		
19		14						
21		16						
23		18						

❓ Designation of R is available for DSE, DPDE only. ❓ When L dimension is 100 or more, the head area is annealed.

Order

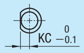
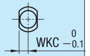
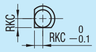
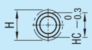
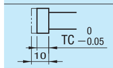
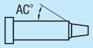
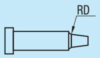
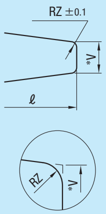
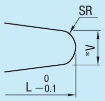
Part Number	—	L	—	F	—	A	—	V	—	C・R
DPDE6	—	38.00	—	F29.00	—	A3.00	—	V2.50	—	R0.5

Days to Ship Quotation

Price Quotation

Alterations

Part Number	—	L	—	F	—	A	—	V	—	C・R	—	(KC・WKC…etc.)
DPDE6	—	38	—	F29.00	—	A3.00	—	V2.50	—	R0.5	—	KC3.4

Alterations	Code	Spec.	1Code
	KC	Single flat cutting KC=0.1mm increments ❓ D/2≦KC＜H/2	Quotation
	WKC	Two flats cutting WKC=0.1mm increments ❓ D/2≦WKC＜H/2	
	RKC	Two flats (right angled) cutting RKC=0.1mm increments ❓ D/2≦RKC＜H/2	
	HC	Head diameter change HC=0.1mm increments ❓ D≦HC＜H ❓ In relation to the head diameter tolerance, alteration may create a straight piece with little difference between the head and shaft in diameter.	
	TC	Head thickness change TC=0.1mm increments ❓ 4.0≦TC＜10, 10−TC≦L max.−L (Dimensions L and F remain unchanged)	
	AC	Changes the standard angle (Ks=45°). AC=1° increments ❓ 30≦AC≦60 ❓ Available for DSC, DPDC, DSD, DPDD only Working limits for DSD, DPDD A+2(C×tanAC°)＜D	
	RD	Changes general R0.3 or less to R0.8～1.0. ❓ Available for DSC, DPDC, DSD, DPDD only D−A≧2.0 C≧1.0 for DSD, DPDD ⊗ Combination with AC code not available	
	RZ	Tip R processing RZ=0.1mm increments *V is a dimension prior to R processing. ❓ $0.3\leqq RZ<\frac{V}{2}$ ⊗ Not available for DSPDL, DPDL	Quotation
	BZ	Tip spherical (SR) processing. *V is a dimension prior to SR processing. ❓ $BZ=SR=\frac{V}{2}$ ⊗ Not available for DSPDL, DPDL ❓ It will be L $^{0}_{-0.1}$	

KC $^{0}_{-0.1}$
WKC $^{0}_{-0.1}$
RKC
RKC $^{0}_{-0.1}$
H
HC $^{0}_{-0.3}$
TC $^{0}_{-0.05}$
10
AC°
RD
RZ ±0.1
*V
ℓ
RZ
*V
SR
*V
L $^{0}_{-0.1}$

Part Number	RZ・BZ max.
DSA,DPDA	ℓ−1.0
DSC,DPDC	$\ell-(1.0+\frac{D-A}{2})$ * When AC code is used $\ell-(1.0+\frac{D-A}{2\tan AC})$
DSD,DPDD	ℓ−(1.0+C)
DSE,DPDE	ℓ−(1.0+R)

❓ Key flat cutting (KC, WKC, RKC) tolerance is $^{0}_{-0.1}$
Tolerance $^{0}_{-0.1}$ remains unchanged when D/2 is designated to align to the shaft diameter.

Dies Steel
SKD61 equivalent
+
Nitrided

DIE CAST CORE PINS

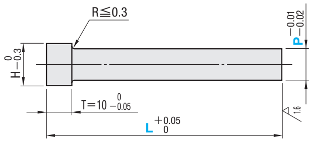
—SHAFT DIAMETER (P) DESIGNATION TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

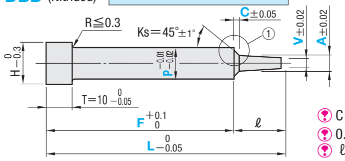
Part Number	M	S	H
DSPB	SKD61 equivalent (DAC)	—	48±2HRC
DSB□			
DPB		Nitrided	Surface 900HV～ Base metal 48±2HRC
DPDB□			

DSPB
DPB (Nitrided)



DSBD
DPDBD (Nitrided)

Select DSBC・DPDBC, when C=(P−A)/2

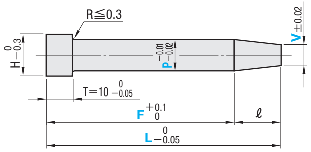


$C<\frac{P-A}{2}$

$0.1\leqq C\leqq 1.5$

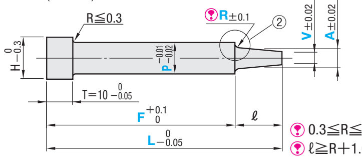
$\ell\geqq C+1.0$

DSBA
DPDBA (Nitrided)



$\ell\geqq 1.0$

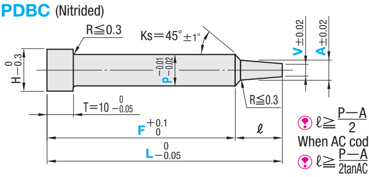
DSBE
DPDBE (Nitrided)



$0.3\leqq R\leqq\frac{P-A}{2}$

$\ell\geqq R+1.0$

DSBC
DPDBC (Nitrided)

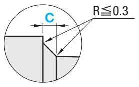


$\ell\geqq\frac{P-A}{2}+1.0$

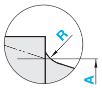
When AC code is used

$\ell\geqq\frac{P-A}{2\tan AC}+1.0$

Details of part ①



Details of part ②



H	Part Number		0.01mm increments					0.1mm increments	ℓmax.
	Type	No.	L	P	F	A	Vmin.	C・R	
8	(No Nitrided) DSPB DSBA DSBC DSBD DSBE (Nitrided) DPB DPDBA DPDBC DPDBD DPDBE	4	30.00 ～ 200.00	3.50～ 3.99	F≧10.00 No need to designate F, A, V when DSPB, DPB are selected.	P>A≧V No need to designate A when DSBA, DPDBA are selected.	1.00	0.1≦C≦1.5 and $C<\frac{P-A}{2}$ (DSBD DPDBD) R≧0.3 and $R\leqq\frac{P-A}{2}$ (DSBE DPDBE)	45.00
9		5		4.00～ 4.99			1.50		50.00
10		6		5.00～ 5.99			2.00		
13		8		6.00～ 7.99					
15		10		8.00～ 9.99					
17		12		10.00～11.99			2.50		
19		14		12.00～13.99					
21		16		14.00～15.99					
23		18		16.00～17.99					

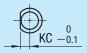
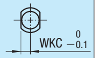
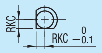
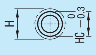
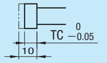
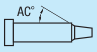
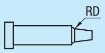
Designation of R is available for DSBE, DPDBE only. When L dimension is 100 or more, the head area is annealed.

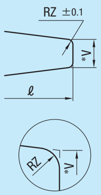
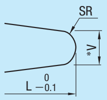
Order	Part Number	—	L	—	P	—	F	—	A	—	V	—	C・R
	DPDBC6	—	50.00	—	P5.70	—	F40.00	—	A5.00	—	V3.00		

Days to Ship Quotation

Price Quotation

Alterations	Part Number	—	L	—	P	—	F	—	A	—	V	—	C・R	—	(KC・WKC…etc.)
	DPDBC6	—	50.00	—	P5.70	—	F40.00	—	A5.00	—	V3.00			—	TC5.0

Alterations	Code	Spec.	1Code
	**KC**	Single flat cutting KC=0.1mm increments KC=P/2 ⋯→ 0.005mm increments possible P/2≦KC<H/2	Quotation
	**WKC**	Two flats cutting WKC=0.1mm increments WKC=P/2 ⋯→ 0.005mm increments possible P/2≦WKC<H/2	
	**RKC**	Two flats (right angled) cutting RKC=0.1mm increments RKC=P/2 ⋯→ 0.005mm increments possible P/2≦RKC<H/2	
	**HC**	Head diameter change HC=0.1mm increments P≦HC<H In relation to the head diameter tolerance, alteration may create a straight piece with little difference between the head and shaft in diameter.	
	**TC**	Head thickness change TC=0.1mm increments 4.0≦TC<10, 10−TC≦L max.−L (Dimensions L and F remain unchanged)	
	**AC**	Changes the standard angle (Ks=45°). AC=1° increments 30≦AC≦60 Available for DSBC, DPDBC, DSBD, DPDBD only Working limits for DSBD, DPDBD A+2(C×tanAC°)<P	
	**RD**	Changes general R0.3 or less to R0.8～1.0. Available for DSBC, DPDBC, DSBD, DPDBD only P−A≧2.0 C≧1.0 for DSBD, DPDBD ⊗ Combination with AC code not available	

Alterations	Code	Spec.	1Code
	**RZ**	Tip R processing RZ=0.1mm increments *V is a dimension prior to R processing. $0.3\leqq RZ<\frac{V}{2}$ ⊗ Not available for DSPB, DPB	Quotation
	**BZ**	Tip spherical (SR) processing. *V is a dimension prior to SR processing. $BZ=SR=\frac{V}{2}$ ⊗ Not available for DSPB, DPB It will be $L_{-0.1}^{\ 0}$	

Part Number	RZ・BZ max.
DSBA,DPDBA	ℓ−1.0
DSBC,DPDBC	$\ell-(1.0+\frac{P-A}{2})$ * When AC code is used $\ell-(1.0+\frac{P-A}{2\tan AC})$
DSBD,DPDBD	ℓ−(1.0+C)
DSBE,DPDBE	ℓ−(1.0+R)

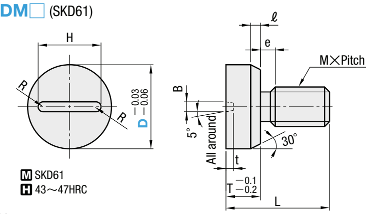
Key flat cutting (KC, WKC, RKC) tolerance is $_{-0.1}^{\ 0}$
When P/2 is designated to align to the shaft diameter, 0.005mm increments is possible, but tolerance $_{-0.1}^{\ 0}$ remains unchanged.

DATE MARKED PINS FOR DIE CAST

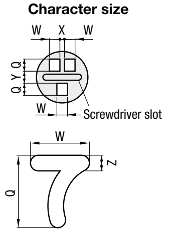
RoHS

■Regular Type

DDM□ (SKD61)

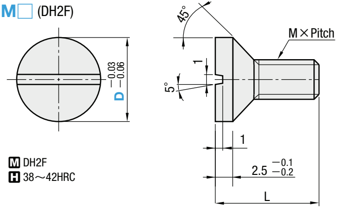


M SKD61
H 43～47HRC



■Small Diameter Type

CDM□ (DH2F)



M DH2F
H 38～42HRC

Part Number		Character size					
Type	D	W	Q	X	Y	Z	Depth
DDM□	8	1.6	2.0	0.5	2.0	0.45	0.3
	12	2.5	3.0	1.0	3.0	0.7	0.5
CDM□	6	0.9	1.2	0.5	2.0	0.3	0.3
	7	1.3	1.6	0.5	2.0	0.4	0.3
	8	1.6	2.0	0.5	2.0	0.45	0.3

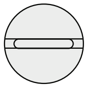
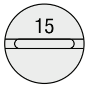
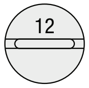
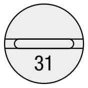
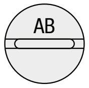
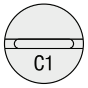
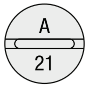
※Angle of lettering engraving 10°

■Regular Type

M×Pitch	L	T	ℓ	e	H	B	t	Part Number		U/Price 1～4			
								Type	D	DDMX	DDMY・DDMM・DDMD	DDMP・DDMN	DDMB
M4×0.7	12	4.2	1.0	1.5	6	1.0	1.0	DDM□	8		Quotation		
M6×1.0	15	5.2	1.2	2	9	1.2	1.2		12				

■Small Diameter Type

M×Pitch	L	Part Number		U/Price 1～4			
		Type	D	CDMX	CDMY・CDMM・CDMD	CDMP・CDMN	CDMB
M3×0.5	10	CDM□	6		Quotation		
M4×0.7	12		7				
M5×0.8	15		8				

Indication mark		None	Year	Month・Day		Free designation type		
Engraving position		—	Top row	Top row	Bottom row	Top row	Bottom row	Top/Bottom rows
Part Number	Regular Type	DDMX	DDMY	DDMM	DDMD	DDMP	DDMN	DDMB
	Small Diameter Type	CDMX	CDMY	CDMM	CDMD	CDMP	CDMN	CDMB
	The driver slot is a through groove with the regular type, a non-through groove with the small diameter type.		 15	 12	 31	 AB	 C1	 A 21

Part Number Type		Engraving position	Characters for engraving
Regular type	Small diameter type		
DDMX	CDMX	—	None
DDMY	CDMY	Top row	16 for 2016 17 for 2017 (Designation possible from September, 2012) 18 for 2018 (Designation possible from September, 2013)
DDMM	CDMM	Top row	1 2 3 4 5 6 7 8 9 10 11 12
DDMD	CDMD	Bottom row	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
DDMP	CDMP	Top row	1 2 3 4 5 6 7 8 9 0
DDMN	CDMN	Bottom row	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
DDMB	CDMB	Top/Bottom rows	(Up to 2 characters can be engraved on each row.)

☎ **Order**

Part Number	—	Top row characters	—	Bottom row characters
DDMB12	—	12	—	2A
CDMY 8	—	12		

Days to Ship Quotation

P **Price** Quotation

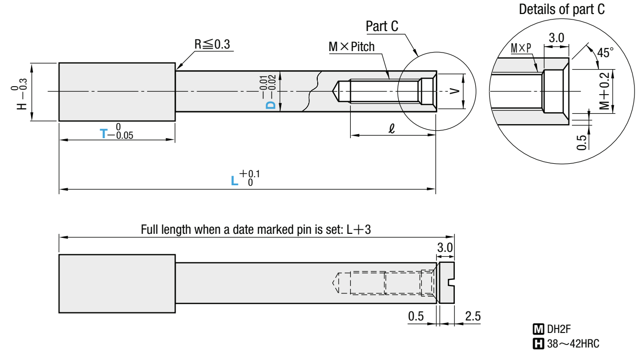
HOLDERS FOR DATE MARKED PIN

—SMALL DIAMETER TYPE—

Non JIS material definition is listed on P.1351 - 1352

RoHS

CDH



M DH2F
H 38～42HRC

CDH is for use with the small diameter date marked pins for die cast (CDM□) only, and cannot be used for the regular type date marked pins (DDM□).

H	M×Pitch	V	ℓ	Part Number		L	T	U/Price
				Type	D	0.1mm increments	1mm increments	1～4
10	M3×0.5	5	10	CDH	6	30.0～150.0	4～20 $T\leqq \frac{L}{2}-5$	Quotation
12	M4×0.7	6	12		7			
13	M5×0.8	7	15		8			

☎ **Order**

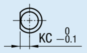
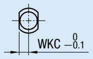
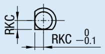
Part Number	—	L	—	T
CDH7	—	100.0	—	T20

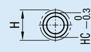
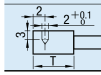
P **Price** Quotation

Days to Ship Quotation

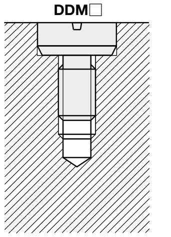
Alterations

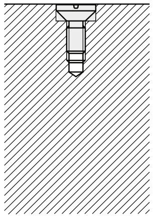
Part Number	—	L	—	T	—	(KC・WKC…etc.)
CDH8	—	100.0	—	T20	—	NC

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments D/2≦KC<H/2	Quotation
	WKC	WKC=0.1mm increments D/2≦WKC<H/2	
	RKC	RKC=0.1mm increments D/2≦RKC<H/2	

Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments D≦HC<H In relation to the head diameter tolerance, alteration may create a straight piece with little difference between the head and shaft in diameter.	Quotation
	NC	Dowel hole boring ⊗ Combination with any other alteration not available.	

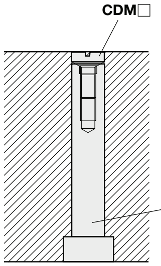
Example





Using Date Marked Pin without Holder

Use the holder dimensions as reference to prepare a tap and counterbore for using a date marked pin alone without the holder.

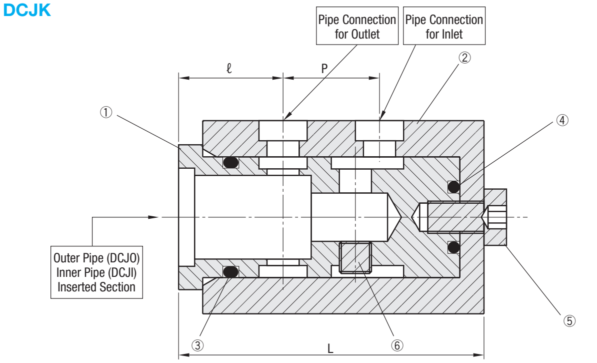


Holder+ Date Marked Pin

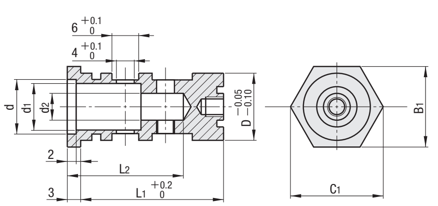
Using the holder makes it easy to perform maintenance work including cleaning and replacement of the date marked pin.

COOLING UNITS

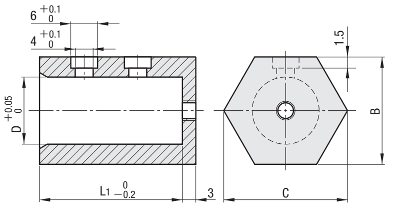
DCJK


Pipe Connection for Outlet
Pipe Connection for Inlet
ℓ
P
①
②
④
Outer Pipe (DCJO)
Inner Pipe (DCJI)
Inserted Section
⑤
③
L
⑥

①Inside・Core


6 +0.1 0
4 +0.1 0
d
d1
d2
D −0.05 −0.10
B1
2
L2
3
L1 +0.2 0
C1

②Cover・Case


6 +0.1 0
4 +0.1 0
1.5
D +0.05 0
L1 0 −0.2
3
C
B

Cooling Unit Components

Parts	① Inside・Core	② Cover・Case	③ O-rings	④ O-rings	⑤ Socket Head Cap Screws	⑥ Set bolts
M	Brass (C3604)	Brass (C3604)	Fluoric rubber	Fluoric rubber	Stainless steel (SUS304)	Stainless steel (SUS304)

Applicable outer pipes		Outer pipe inserted section		Applicable inner pipes	Inner pipe inserted section		B	C	L	ℓ	P	Part Number		U/Price
TYPE	Inlay section diameter	Inlay diameter d	Depth		Hole dia. d_2	Depth						Type	No.	1～9
DCJO 1	8.9	8.9	2	DCJI 1	4	24	18	20	39	9	14	DCJK	1	Quotation
DCJO 2	12.2	12.2		DCJI 2	6	25	21	23.5	40	10			2	
DCJO 3	15.7	15.7		DCJI 3	8		27	30	42				3	

Components

Part Number		① Inside・Core								② Cover・Case		③ O-rings	④ O-rings	⑤ Socket Head Cap Screws	⑥ Set bolts
Type	No.	B_1	C_1	D	d	d_1	d_2	L_1	L_2	B	C				
DCJK	1	15	17	12	8.9	8	4	33	26	18	20	ORP 9	ORP 5	CBSS 3— 8	MSSU 3—3
	2	18	20	15	12.2	10	6	34	27	21	23.5	ORP 11	ORP 6	CBSS 4— 8	MSSU 4—4
	3	21	24	18	15.7	13	8	36		27	30	ORP 14	ORP 10	CBSS 5—10	MSSU 4—4

Order

Part Number
DCJK1

Days to Ship Quotation

Price Quotation

How to assemble

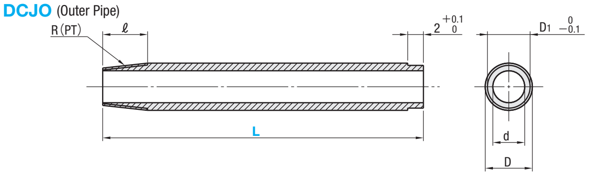
- Inner pipe should be installed by cutting of an edge surface on cooling unit side and fixing by set bolt toward cooling water inlet. Cutting process is performed as standard for inner pipe (DCJI).
- Lay-install the outer pipe, inlet pipe and outlet pipe. Surface for outer pipe welding should be installed by introduction machining (inlay machining) to fit the part's inner diameter. Inlay machining is performed as standard for outer pipe (DCJO).
- After fixing outer pipe on the cooling side, fix inlet and outlet pipes by fixing bolts in direction of your designation.
- Be sure to apply grease in order to protect O-rings during assembly.

Do not use liquid other than cooling water.

PIPES FOR COOLING UNIT

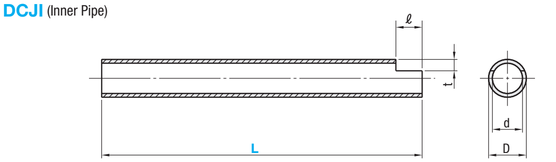
Non JIS material definition is listed on P.1351 - 1352

RoHS **DCJO** (Outer Pipe)


R (PT)
ℓ
2 +0.1 0
D1 0 −0.1
L
d
D

M STPG370(Sch40)

RoHS **DCJI** (Inner Pipe)



M SUS304

Outer Pipes

Applicable Cooling Units	Inlay section diameter D_1	Outer diameter D	Inner diameter d	R(PT)	ℓ	Part Number		L
						Type	No.	5mm increments
DCJK1	8.9	10.5	7.1	1/8	10	DCJO	1	50～300
DCJK2	12.2	13.8	9.4	1/4			2	
DCJK3	15.7	17.3	12.7	3/8	12		3	

Inner Pipe

Applicable Cooling Units	Outer diameter D	Inner diameter d	ℓ	t	Part Number		L
					Type	No.	5mm increments
DCJK1	4	3	5	1	DCJI	1	50～300
DCJK2	6	4	6	2		2	
DCJK3	8	6				3	

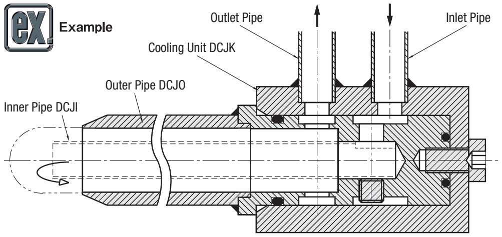
Order

Part Number	—	L
DCJO 1	—	100
DCJI 2	—	125

Days to Ship Quotation

Price Quotation

Example


Outlet Pipe
Inlet Pipe
Cooling Unit DCJK
Outer Pipe DCJO
Inner Pipe DCJI

Lay-install the outer pipe onto cooling unit. Note on the directionality of the inner pipes.

<Application Table>

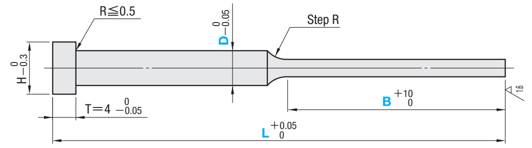
Cooling Units	Outer Pipes	Inner Pipes
DCJK1	DCJ01	DCJ I 1
DCJK2	DCJ02	DCJ I 2
DCJK3	DCJ03	DCJ I 3

BURR CUTTING PINS FOR TRIM

❢ Non JIS material definition is listed on P.1351 - 1352

RoHS

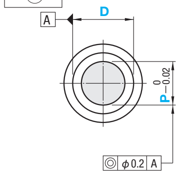
Part Number		Tip shape is selected from Tip shape A, R, E below.
Type	Tip shape	
DCP	Ⓐ Ⓡ Ⓔ	



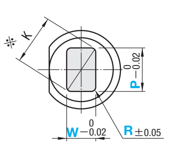
Range of guaranteed shaft diameter precision (Details ☞ **P.1301**)
Range of guaranteed base material hardness (Details ☞ **P.1303**)
Step R Ⓐ (R8 to 12) (Details ☞ **P.1302** Upper step)
Ⓡ Ⓔ (R85 to 95) (Details ☞ **P.1301** Lower step)

M SKH51
H 58～60HRC

Tip shape Ⓐ

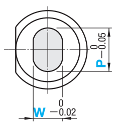


Tip shape Ⓡ



❢ P≧W
❢ 0.2≦R≦1.0
and
$R<\frac{W}{2}-0.5$
❢ ※ $K=\sqrt{P^2+W^2}$,
K is dimension before R-chamfering.

Tip shape Ⓔ



❢ P≧W+0.5

※ $K=\sqrt{P^2+W^2}$,
K is dimension before R-chamfering.
(R=W/2)

H	Part Number			L	0.01mm increments			Kmax.	B	R
				0.01mm increments	Ⓐ	Ⓡ Ⓔ			1mm increments	0.1mm increments
	Type	Tip shape	D		min. P max.	min. P max.	W			
8	DCP	Ⓐ Ⓡ Ⓔ	5	50.00～200.00	3.00～ 4.99	1.50～ 4.80	1.00～	4.9	Ⓐ 10≦B≦50 and B≦L−40 Ⓡ Ⓔ 10≦B≦50 and B≦W×30 and B≦L−40	0.2≦R≦1.0 and $R<\frac{W}{2}-0.5$
9			6		4.00～ 5.99	2.00～ 5.80		5.9		
10			7		5.00～ 6.99	2.50～ 6.80		6.9		
11			8		6.00～ 7.99	2.50～ 7.80		7.9		
15			10		8.00～ 9.99	3.00～ 9.80		9.9		
17			12		10.00～11.99	4.00～11.80		11.9		

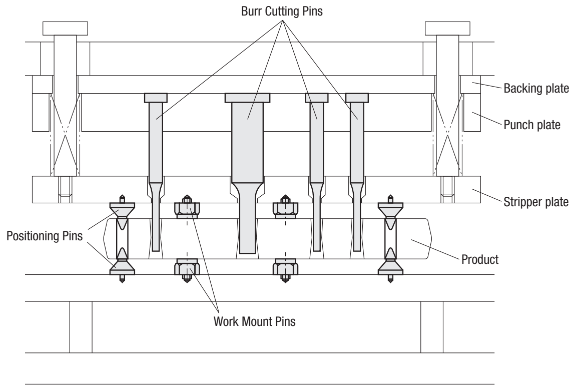
❢ Designate P・W dimensions within the K max. ❢ Ⓡ P≧W, Ⓔ P≧W+0.5

Order

Part Number	L	P	W	B	R (Only for Ⓡ)
DCPA 8	150	P6.00		B30	
DCPR 10	130	P8.00	W5.30	B40	R0.5

Days to Ship Quotation

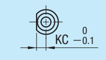
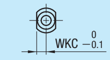
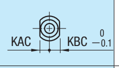
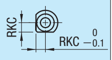
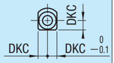
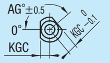
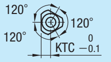
Example



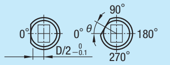
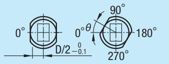
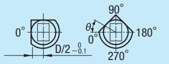
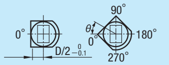
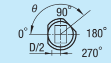
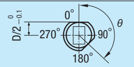
Alterations

Part Number	L	P	W	B	R (Only for Ⓡ)	(AKC・AWC ··· etc.)
DCPA8	150	P6.00		B30		TC3

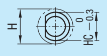
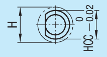
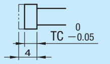
Tip shape Only for Ⓐ

Alterations	Code	Spec.	1Code
	KC	KC=0.1mm increments ❢ D/2≦KC<H/2	
	WKC	WKC=0.1mm increments ❢ D/2≦WKC<H/2	
	KAC KBC	KAC, KBC=0.1mm increments ❢ D/2≦KAC<KBC<H/2	Quotation
	RKC	RKC=0.1mm increments ❢ D/2≦RKC<H/2	
	DKC	DKC=0.1mm increments ❢ D/2≦DKC<H/2	
	KGC	KGC=0.1mm increments AG=1° increments ❢ D/2≦KGC<H/2, 0<AG<360	
	KTC	KTC=0.1mm increments ❢ D/2≦KTC<H/2	

Tip shape Only for Ⓡ Ⓔ

Alterations	Code	Spec.	1Code
	AKC	AKC=1° increments ❢ 0<AKC<360 ❢ No need to designate AKC0	
	AWC	AWC=1° increments ❢ 0≦AWC<360	
	ARC	ARC=1° increments ❢ 0≦ARC<360	Quotation
	ADC	ADC=1° increments ❢ 0≦ADC<360	
	KGA	KGA=1° increments ❢ 0<KGA<360	
	NHN	KGB=1° increments ❢ 0<KGB<360	

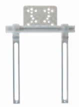
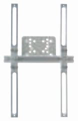
Available for all forms

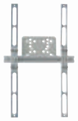
Alterations	Code	Spec.	1Code
	HC	HC=0.1mm increments ❢ D+1≦HC<H	
	HCC	HCC=0.1mm increments ❢ D+1≦HCC<H−0.3	Quotation
	TC	TC=0.1mm increments ❢ 2.0≦TC<4 (Dimension L remains unchanged.) ❢ 4−TC≦L max.−L	
	NHC	Numbering on the head How to order ☞ **P.54**	
	NHN	Automatic sequential numbering on the head How to order ☞ **P.54**	

Price Quotation

COMPONENTS FOR INJECTION MOLDING

COMPONENTS FOR INJECTION MOLDING



Product Name Part Number	Adjustable chuck plates HCKM	HCKMT—S	Adjustable chuck plates—Thin Type— HCKMT—SH	HCKMT—W	HCKMT—WH

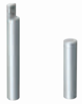
Internet

Mini Cylinder Pad—Square Shape—
MBPS

—Round Shape—
MBPR

Adjustable Mini Cylinder Brackets
MCBF—B

Internet


—Shaft—
MCBF—SP MCBF—SF

—Shaft Clamp—
MCBF—HS MCBF—HSL

Adsorption Pads
H—MPCGN H—MPCGS

Internet

Adsorption Metal Fittings
H—NAMPC

Set screws
H—TNMPC

Adsorption Pads
M—PJG□ M—PCG□

Internet

Adsorption Metal Fittings
KTPCY

Set Screws
TNP□

Adsorption Pads
M—VPS M—VPBS

Internet

Adsorption Metal Fittings
M—VPHC M—VPHE

Adjustable Vacuum Cup Brackets
MABF—B

—Shaft—
MABF—S

Internet

—Shaft Clamp—
MABF—H

Large—Diameter Adjustable
MABFL—B MABFL—S

Internet

Waterproof polyurethane tube/soft polyurethane tube
PUT PUTL PUTY PUTYL

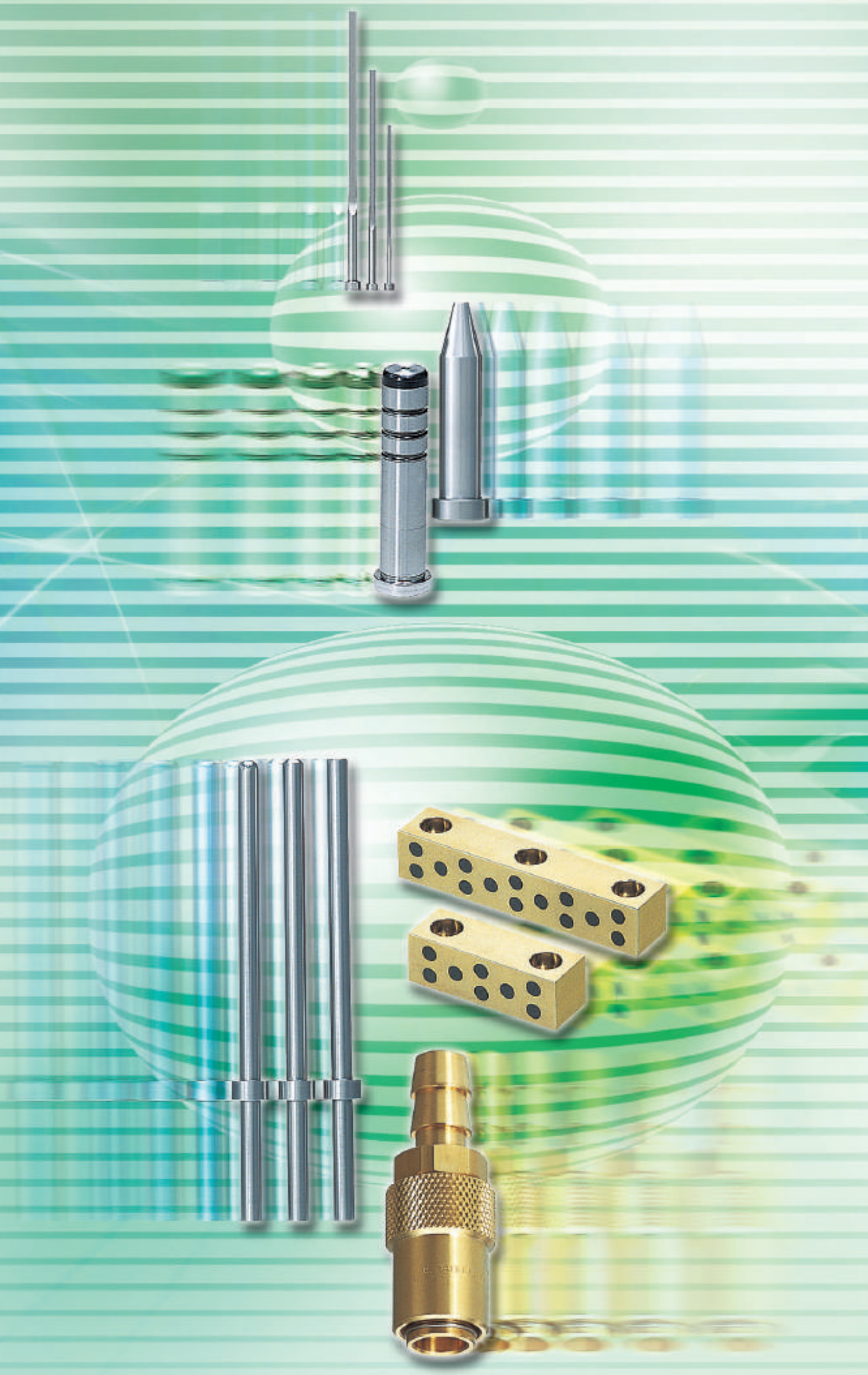
Barb Joint · Universality · Universal Elbow · Plug
SRTG□N MUTEN MPLGN

Miniature quick-fitting joint
MNCN MNCNP MNCNL MNCLYT

Internet

Insert for Soft Tube
PUIT

Internet



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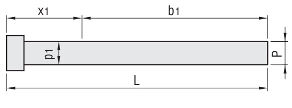
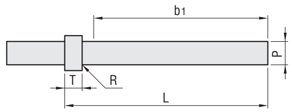
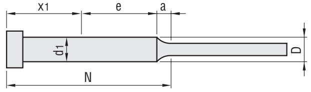
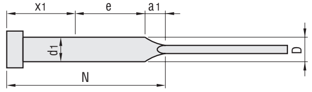
〔PRODUCT DATA〕

GUARANTEED RANGE OF SHAFT-DIAMETER PRECISION FOR EJECTOR PINS

■Guaranteed Range of Shaft-Diameter Precision for Ejector Pins

	Straight Ejector Pins	Free Flange-Position Ejector Pins
Shaft diameter (P) **Guaranteed precision range** **Length (b1)**	 $b_1 \geqq L-x_1$ max.	 $b_1 \geqq L-T-R-5$ ＊R is the size of R below the flange.
	Stepped Ejector Pins	**Rectangular Ejector Pins**
Shaft diameter (D) **Guaranteed precision range** **Length (e)**	 $e \geqq N-5-x_1$ max. $-a-3$ ＊5：Tolerance of length of N. ＊a：Length of Step R section. ＊3：Tolerance of Step R section length.	 $e \geqq N-5-x_1$ max. $-a_1-3$ ＊5：Tolerance of length of N. ＊a1：Length of Step R section. ＊3：Tolerance of Step R section length.

M	Head thickness (T)	x1 max.	
SKH51	T4 (EPY−L, EHYF, EVSL, EVSF)	10	Refer to the section below regarding the shaft diameter designation (0.01mm increments) types.
	T4 (EPV−L・P<0.8)	10	
	T4 (EPV−L・P≧0.8)	30	
	T4 (4mm)	30	
	JIS (4・6・8mm)	35	
SUS440C	T4 (4mm)	30	
	JIS (4・6mm)	35	
SKD61	T4 (4mm)	30	
SKD61 ＋ Nitriding	T0 (Headless)	0	
	T4 (4mm)	30	
	JIS (4・6・8mm)	35	
	T10 (10mm)	40	
SKD61 Prehardened	JIS (4・6・8mm)	35	

●Straight Ejector Pins

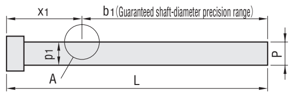
T (P)	p1 Precision
$P^{\ 0}_{-0.002}$	$p_1=P^{\ 0}_{-0.1}$
$P^{\ 0}_{-0.005}$	
$P^{-0.01}_{-0.02}$	$p_1=P^{-0.01}_{-0.1}$
$P^{-0.01}_{-0.03}$	
$P^{-0.01}_{-0.04}$	$p_1=P^{-0.01}_{-0.15}$
$P^{-0.01}_{-0.05}$	

●Stepped and Rectangular Ejector Pins

T (D)	d1 Precision
$D^{\ 0}_{-0.01}$	$d_1=D^{\ 0}_{-0.1}$
$D^{\ 0}_{-0.02}$	

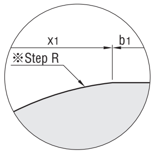
Refer to SKH51 for the guaranteed range of precision for SKH51 ＋ hard chrome plating.

■Straight Ejector Pins—Shaft Diameter Designation (0.01mm Increments) Types—



Misumi's straight ejector pin with relief enables to be designated in 0.01 mm increments of the shaft diameter (P), even with long length L.
The guaranteed range of shaft-diameter (P) precision is b1,and the shaft-diameter area outside of this is relief processed.

●Detail of Part A



As shown in the illustration, smooth Step R processing is performed on the junction section between the shaft-diameter (P) area and the relief area.
※Size of Step R: approximately 100R (reference value).

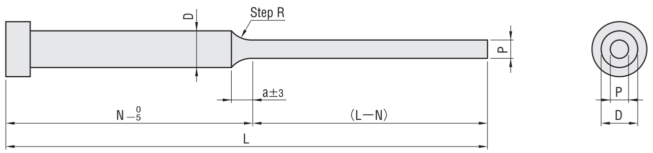
M	Head thickness (T)	T (P)	p1 Precision	x1 max.							
				L150.00 or less	L150.01 ~200.00	L200.01 ~250.00	L250.01 ~300.00	L300.01 ~350.00	L350.01 ~400.00	L400.01 ~450.00	L450.01 ~500.00
SKH51	T4 (EPV−G,EPVB・P<0.800)	$P^{\ 0}_{-0.002}$	$p_1=P^{\ 0}_{-0.1}$	10	—	—	—	—	—	—	—
	T4 (EPV−G,EPVB・P≧0.800)			30							
	T4 (EPY−G, EPYB)	$P^{\ 0}_{-0.005}$		10							
	T4 (4mm)			30	30	110	160	210			
	JIS (4・6・8mm)			35	35						
	T4 (4mm)	$P^{-0.01}_{-0.02}$	$p_1=P^{-0.01}_{-0.1}$	30	30						
	JIS (4・6・8mm)			35	35						
SUS440C	T4 (4mm)	$P^{\ 0}_{-0.005}$	$p_1=P^{\ 0}_{-0.1}$	30	30	—	—	—			
	JIS (4・6・8mm)			35	35						
SKD61	T4 (4mm)	$P^{\ 0}_{-0.005}$ $P^{-0.01}_{-0.02}$	$p_1=P^{\ 0}_{-0.1}$ $p_1=P^{-0.01}_{-0.1}$	30	60	110	160	210	260	310	360
SKD61 ＋ Nitriding	T4 (4mm)	$P^{-0.01}_{-0.02}$ (P≦12.00)	$p_1=P^{-0.01}_{-0.1}$	30	30	30	30	210	—	—	—
	JIS (4・6・8mm)			35	35	35	35				
	T10 (10mm)	$P^{-0.01}_{-0.03}$ (P>12.00)		40	40	40	40	—			
SKD61 Prehardened	JIS (4・6・8mm)			35	35	35	35				

Refer to SKH51 for the guaranteed range of precision for SKH51 ＋ hard chrome plating .

〔PRODUCT DATA〕

STEP R AND CONCENTRICITY OF STEPPED AND RECTANGULAR EJECTOR PINS

■Step R and Concentricity of Stepped Ejector Pins



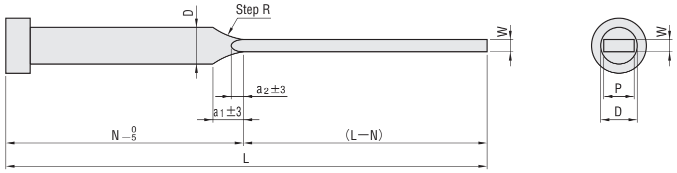
In order to ensure the effective dimensions of the length (L−N) of tip diameter (P), (L−N) is designed to be a plus tolerance and N is a minus tolerance.
Step R is configured to form a smooth transition between tip diameter (P) and shaft diameter (D).

Size of step R: approximately R8 to 12.＊
＊The size of step R is determined by the size of the grindstone used to process it. This is not a guaranteed value for R.

Formula used for calculating the length (a) of step R：$a=\sqrt{\frac{D-P}{2}\times\left(2R-\frac{D-P}{2}\right)}$

Concentricity of tip diameter (P) and shaft diameter (D)：0.2mm or less

■Step R and Concentricity of Rectangular Ejector Pins



In order to ensure the effective dimensions of the length (L−N) of the rectangular tip section (P・W), (L−N) is designed to be a plus tolerance and N is a minus tolerance. Step R is configured to form a smooth transition between the rectangular tip section (P・W) and the shaft diameter (D).

Size of step R: approximately R95～105.＊ (N Short type R65～95)
＊The size of step R is determined by the size of the grindstone used to process it. This is not a guaranteed value for R.

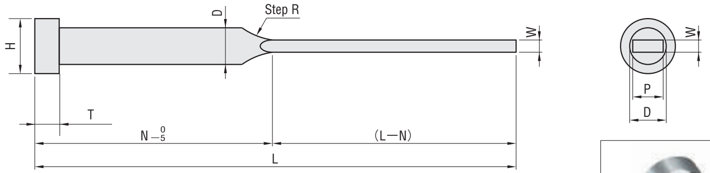
Formula used for calculating the length (a1 and a2) of step R：$a_1=5+\sqrt{\frac{D-W}{2}\times\left(2R-\frac{D-W}{2}\right)}$

$$a_2=5+\sqrt{\frac{D-P}{2}\times\left(2R-\frac{D-P}{2}\right)}$$

＊The above formulas include profile error from rough and finish processing.

Concentricity of the rectangular tip section (P・W) and shaft diameter (D)：0.2mm or less

■Relationship with Step R and Head Part of Stepped Center Pins



Head part (ϕH) may contact to grindstone depending on specifications between Step R and P・W, N, ϕD or ϕH dimensions. (Refer to the right photo)
Following formula is solutions to avoid the contact. This is theoretical value, but not a guaranteed one.
(In case of P dimensions direction, please calculate by replacing W by P)

Size of step R : approximately R 95～105.＊ (R65～95 for N dimension short type)
The size of step R is determined by the size of grindstone used to process it.
This is not a guaranteed value for R.

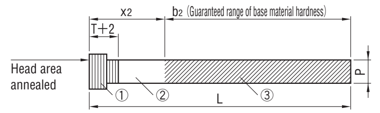
$$N>T+5+\sqrt{\left[\frac{H-W}{2}\times\left\{2\times(R-0.2)-\frac{H-W}{2}\right\}-0.04\right]}$$

〔PRODUCT DATA〕

GUARANTEED RANGE OF HARDNESS OF THE EJECTOR PIN BASE MATERIAL, AND GUARANTEED RANGES OF NITRIDING AND SURFACE HARDNESS

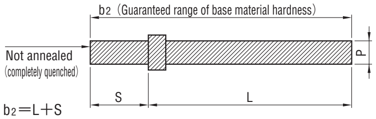
■Guaranteed Range of Hardness of the Ejector Pin Base Material

Straight Ejector Pins



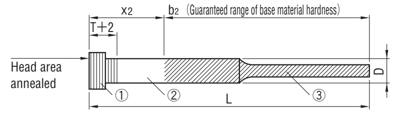
b2≧L−x2 max.

Free Flange-Position Ejector Pins


b2 (Guaranteed range of base material hardness)
Not annealed (completely quenched)
P
S
L

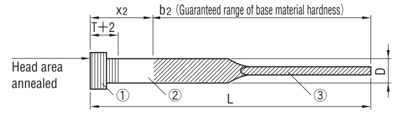
b2=L+S

Stepped Ejector Pins



b2≧L−x2 max.

Rectangular Ejector Pins



b2≧L−x2 max.

M	Head Thickness (T)	x2 max.	Ejector Pin Base Material Hardness		
			①	②	③(Guaranteed Range of Base Material Hardness)
※SKH51	T4 (EPY−L EPV−L EPVB EPY−G EPV−G EPYB EVSL EVSG EVSF EHYF ERVYF)	0	58～60HRC Overall quenching (no annealing)	58～60HRC Overall quenching (no annealing)	58～60HRC
	T4 (4mm)	30	28～35HRC (reference value)	28～60HRC (reference value)	58～60HRC
	JIS (4・6・8mm)	35			
SUS440C	T4 (4mm)	30	26～35HRC (reference value)	26～60HRC (reference value)	56～60HRC
	JIS (4・6mm)	35			
SKD61	T4 (4mm)	30	28～45HRC (reference value)	28～55HRC (reference value)	50～55HRC
SKD61 + Nitriding	T0 (Headless)	0	40～45HRC (excluding nitrided surface)	40～45HRC (excluding nitrided surface)	40～45HRC (excluding nitrided surface)
	T4 (4mm)	30	28～45HRC (reference value) (excluding nitrided surface)	28～45HRC (reference value) (excluding nitrided surface)	40～45HRC (excluding nitrided surface)
	JIS (4・6・8mm)	35			
	T10 (10mm)	40	28～43HRC (reference value) (excluding nitrided surface)	28～43HRC (reference value) (excluding nitrided surface)	40～43HRC (excluding nitrided surface)
SKD61 Prehardened	JIS (4・6・8mm)	35	28～45HRC (reference value)	28～45HRC (reference value)	40～45HRC

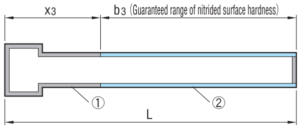
※The following products are applied with overall quenching.
P≦0.2 for straight ejector pins EPH

- Annealing was performed on the heads of SKH51 SUS440C and SKD61 to achieve a level of 30HRC.
  Annealing was performed on heads of SKD61＋nitriding and SKD61 prehardened to achieve a level of 40HRC.

■Guaranteed Ranges of Nitriding and Surface Hardness

Straight Ejector Pins

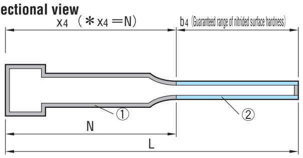
※**Cross-sectional view**



b3≧L−x3 max.

Stepped Ejector Pins

※**Cross-sectional view**



b4≧L−x4 (＊x4＝N)

M	Head Thickness (T)	x3 max.	Ejector Pin Surface Hardness	
			①	② (Guaranteed range of nitrided surface hardness)
SKD61 + Nitriding	T0 (Headless)	0	Base Material Hard ～ 900HV～ (without nitrided layer) (with nitrided layer)	900HV～
	T4 (4mm)	30		
	JIS (4・6・8mm)	35		
	T10 (10mm)	40		

〔PRODUCT DATA〕

EJECTOR PIN HARDNESS

●Nitriding (Nitrided)

Nitriding is one of the steel surface treatment methods.

The steel is placed in a furnace that is then filled with nitrogen gas, and at high temperatures (around 500℃) a hardened layer combined with the nitrogen is formed on the surface of the steel.

●Nitrided Depth

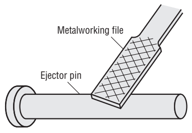
This refers to the depth of the hardened layer formed on the surface of the steel by nitriding treatment.

The nitrided depth of MISUMI's 900HV～ plastic mold ejector pin is 0.003～0.008 mm (reference value), and the depth of the hardened layer is 0.1 mm deeper (reference value) than the surface.

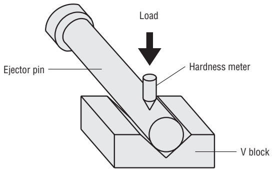
The nitrided depth of straight ejector pin is controlled by adjusting nitriding temperature and treatment time in accordance with shaft diameter size.

In the case of stepped ejector pins, nitrided depth is controlled by adjusting nitriding temperature and treatment time in accordance with tip diameter (P) size.
For this reason, the surface hardness of the shaft diameter (D) area is slightly lower at around 500HV (reference value).

■Ejector Pin Hardness



Normally, it is quite easy to file down an ejector pin using a regular file (metalworking file).
With the SKD61＋Nitriding ejector pin, however, the nitriding treatment makes it difficult to file down, because the file does not bite as easily into the surface. The nitrided layer is several microns thick, so a little pressure should be applied to the file.
※Most regular metalworking files have a hardness of 68 to 70HRC.



How to measure hardness of ejector pins：

1) When quick identification of hardness is desired
→A simple file for hardness checking is convenient.

2) When precise hardness measurement is desired
→Use of a Vickers hardness meter or micro-Vickers hardness meter is recommended.

Test load is variable for Vickers hardness meter in hardness measurement so that it is suited for hardness checks on small, thin, or round objects such as ejector pins.

Tip Rockwell hardness meter is generally said to be inappropriate for hardness measurement on small cylindrical object like ejector pin.

Rockwell hardness meter (C scale) applies a large load (150kgf) on the measured object by diamond cone indenter when measuring.
When measured object is not flat (spherical surface), cone indenter slips and measurement error may occur to yield hardness lower than the actual value.
This error needs data correction according to the hardness meter manual. (Thinner the object, larger the error.)
In order to minimize the measurement error in Rockwell hardness meter (C scale), a flat surface must be created as the measuring point.
Therefore it is not suited for measuring thin plates.
(It generally needs thickness of 1.2mm or more for hardness measurement.)

General guide (reference) for measuring cylindrical object (curved surface) with Rockwell hardness meter：

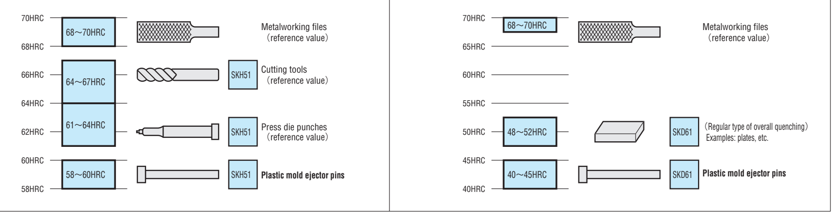
～Near ϕ6mm············ Not suited because error is too large and measuring is difficult.
ϕ6.5～9mm··············· Though correction in accordance with the manual is necessary, error is large and generally not suited.
ϕ10～25mm··············· Correction in accordance with the manual is necessary.
Near ϕ30mm～············ No data correction necessary after measurement

＊Although there are some models in the Rockwell hardness meter which can change scale from C scale (HRC) to A Scale (HRA) or D Scale (HRD), these models are not suited to rounded shapes, because a load applied on A or D scale at the time of the measurement is very high load of 60 or 100kgf.

※Please refer to manual for the hardness meter for details.

■MISUMI's Ejector Pin Thermal Refining Hardness and General Thermal Refining Hardness

M SKH51 (JIS high-speed steel) **M SKD61 (JIS die steel), prehardened, and nitrided**



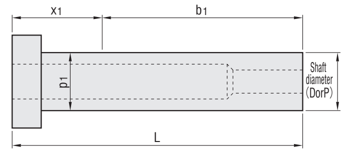
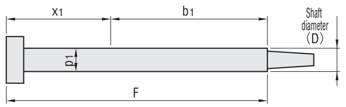
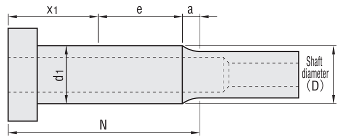
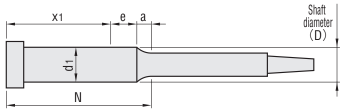
■Precautions when Using Ejector Pins for Applications other than Plastic Mold Ejection

MISUMI's ejector pins are thermally refined to a tough hardness that is ideal for use with plastic molds.
For this reason, the SKH51 SKD61＋Nitriding and SKD61 Prehardened product groups have been given a base-material hardness that is slightly lower than that of products widely being employed for general applications.
In addition, the head section of our ejector pins have been annealed, giving them a hardness that is slightly below that of the indicated base-material hardness.
Please refer to the section on "Guaranteed Range of Hardness of the Ejector Pin Base Material" on the previous page.

〔PRODUCT DATA〕

GUARANTEED RANGE OF SHAFT-DIAMETER PRECISION FOR EJECTOR SLEEVES AND CENTER PINS

■Guaranteed Range of Shaft-Diameter Precision for Ejector Sleeves

	Straight Ejector Sleeve	Center Pin—Shaft Diameter (D) Selection Type—
Shaft diameter (DorP) Guaranteed precision range Length (b1)	 $b_1 \geqq L-x_1$ max.	 $b_1 \geqq F-x_1$ max. or $b_1 \geqq L-$(tip length)$-x_1$ max. For the shaft diameter (P) designation types, refer to the explanation below.
	Stepped Ejector Sleeve	**Stepped Center Pin**
Shaft diameter (D) Guaranteed precision range Length (e)	 $e \geqq N-5-x_1$ max.$-a-3$ ∗a：Length of step R section ∗5：Tolerance of length of N ∗3：Tolerance of step R section length	 $e \geqq N-5-x_1$ max.$-a-3$ ∗a：Length of step R section ∗5：Tolerance of length of N ∗3：Tolerance of step R section length

M	Head Thickness (T)	x_1 max.
SKH51	T4 (4mm)	30∗
	JIS (4·6·8mm)	35
SKD61	T4 (4mm)	30
SKD61 + Nitriding	T4 (4mm) ECB, ECBB	10
	T4 (4mm)	30
	JIS (4·6·8mm)	35
	T10 (10mm)	40

This does not apply to the shaft diameter (P) designation type center pins. Refer to the explanation below for details.

●Straight Ejector Sleeves
●Center Pins

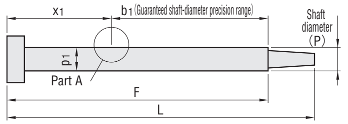
T (DorP)	p_1 Precision
$(DorP)^{\ 0}_{-0.005}$	$p_1=(DorP)^{\ 0}_{-0.1}$
$(DorP)^{-0.01}_{-0.02}$	$p_1=(DorP)^{-0.01}_{-0.1}$
$(DorP)^{-0.01}_{-0.03}$	

●Stepped Ejector Sleeves
●Stepped Center Pins

T (D)	d_1 Precision
$D^{\ 0}_{-0.005}$	$d_1=D^{\ 0}_{-0.1}$
$D^{\ 0}_{-0.02}$	$d_1=D^{\ 0}_{-0.1}$
$D^{-0.01}_{-0.02}$	$d_1=D^{-0.01}_{-0.1}$
$D^{-0.02}_{-0.04}$	$d_1=D^{-0.02}_{-0.1}$

∗When L20.00～39.99 is x1 max.＝10

■Center Pins —Shaft diameter (P) designated type—

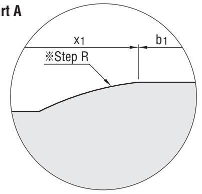


$b_1 \geqq F-x_1$

Misumi's center pin with relief enables to be designated in 0.01mm or 0.1mm increments of the shaft diameter (P), even with long length L.

The guaranteed range of shaft-diameter (P) precision is b_1, and the shaft-diameter area outside of this is relief processed.

●Detail of Part A



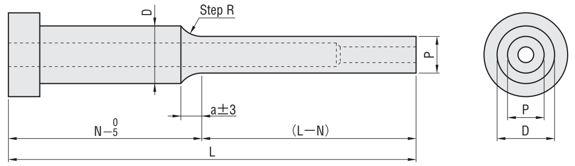
●When L≧200.01
As shown in the illustration, smooth step R processing is performed on the junction section between the shaft-diameter (P) area and the relief area.
※Size of step R: approximately 100R (reference value)

M	Head Thickness (T)	T (P)	p_1 Precision	x_1 max.							
				L150.00 or less	L150.01 ～200.00	L200.01 ～250.00	L250.01 ～300.00	L300.01 ～350.00	L350.01 ～400.00	L400.01 ～450.00	L450.01 ～500.00
SKH51 (※P 0.01mm increments)	T4 (4mm)	$P^{\ 0}_{-0.005}$	$p_1=P^{\ 0}_{-0.1}$	30	30	110	160	210	—	—	—
	JIS (4·6·8mm)			35	35						
	T4 (4mm)	$P^{-0.01}_{-0.02}$	$p_1=P^{-0.01}_{-0.1}$	30	30						
	JIS (4·6·8mm)			35	35						
SKD61 (※P 0.01mm increments)	T4 (4mm)	$P^{\ 0}_{-0.005}$	$p_1=P^{\ 0}_{-0.1}$	30	60	110	160	210	—	—	—
		$P^{-0.01}_{-0.02}$	$p_1=P^{-0.01}_{-0.1}$								
SKD61＋Nitriding (※P 0.1mm increments)	T4 (4mm)	$P^{-0.01}_{-0.02}$ (P≦12.0)	$p_1=P^{-0.01}_{-0.1}$	30	30	30	30	210	260	310	360
	JIS (4·6·8mm)	$P^{-0.01}_{-0.03}$ (P>12.0)		35	35	35	35				

〔PRODUCT DATA〕

STEP R AND CONCENTRICITY OF STEPPED EJECTOR SLEEVES AND STEPPED CENTER PINS

■Step R and Concentricity of Stepped Ejector Sleeves



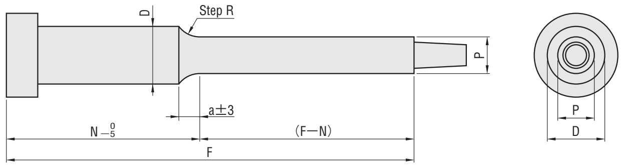
In order to ensure the effective dimensions of the length (L−N) of tip diameter (P), (L−N) is designed to be a plus tolerance and N is a minus tolerance. Step R is configured to form a smooth transition between the tip diameter (P) and the shaft diameter (D).

Size of step R：approximately R8 to 12.∗
∗The size of step R is determined by the size of the grindstone used to process it. This is not a guaranteed value for R.

Formula used for calculating the length (a) of step R：$a=\sqrt{\frac{D-P}{2}\times\left(2R-\frac{D-P}{2}\right)}$

Concentricity of tip diameter (P) and shaft diameter (D)：0.2mm or less

■Step R and Concentricity of Stepped Center Pins



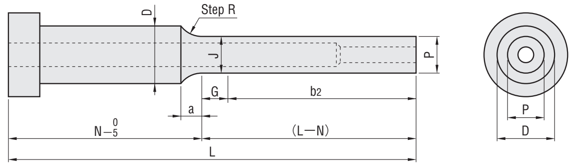
In order to ensure the effective dimensions of the length (F−N) of tip diameter (P), (F−N) is designed to be a plus tolerance and N is a minus tolerance. Step R is configured to form a smooth transition between the tip diameter (P) and the shaft diameter (D).

Size of step R: approximately R8 to 12.∗
∗The size of step R is determined by the size of the grindstone used to process it. This is not a guaranteed value for R.

Formula used for calculating the length (a) of step R：$a=\sqrt{\frac{D-P}{2}\times\left(2R-\frac{D-P}{2}\right)}$

Concentricity of tip diameter (P) and shaft diameter (D)：0.2mm or less

■Guaranteed Range of Tip-Diameter Precision for Stepped Ejector Pins



b2＝Guaranteed range of tip-diameter (P) Precision

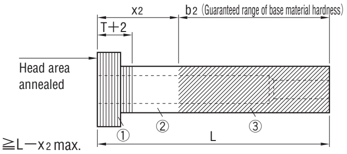
M	b2 Guaranteed precision range	(L−N)	G max.	(P) T	J T
SKH51	$b_2 \geqq (L-N)-$Gmax.	40.00 or less	3	$P^{\ 0}_{-0.005}$	$J^{\ 0}_{-0.03}$
		40.01～ 60.00	10		
		60.01～ 80.00	15		
		80.01～100.00	20		
		100.01～125.00	25		
SKD61＋Nitriding	$b_2 \geqq (L-N)-$Gmax.	40.00 or less	3	$P^{-0.01}_{-0.02}$	$J^{-0.01}_{-0.05}$
		40.01～ 60.00	10		
		60.01～ 80.00	15		
		80.01～100.00	20	$P^{-0.01}_{-0.03}$	
		100.01～125.00	25		
		125.01～	25		

〔PRODUCT DATA〕

GUARANTEED RANGE OF HARDNESS OF THE EJECTOR SLEEVE AND CENTER PIN BASE MATERIAL

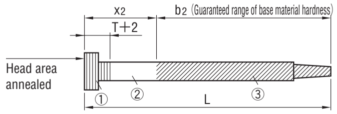
■Guaranteed Range of Hardness of the Ejector Sleeve and Center Pin Base Material

Straight Ejector Sleeve


x2
T+2
b2 (Guaranteed range of base material hardness)
Head area annealed
①
②
③
L

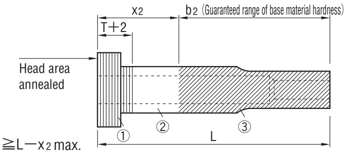
$b_2 \geqq L - x_2$ max.

Center Pin


x2
T+2
b2 (Guaranteed range of base material hardness)
Head area annealed
①
②
③
L

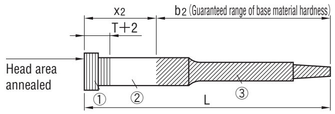
$b_2 \geqq L - x_2$ max.

Stepped Ejector Sleeve


x2
T+2
b2 (Guaranteed range of base material hardness)
Head area annealed
①
②
③
L

$b_2 \geqq L - x_2$ max.

Stepped Center Pin


x2
T+2
b2 (Guaranteed range of base material hardness)
Head area annealed
①
②
③
L

$b_2 \geqq L - x_2$ max.

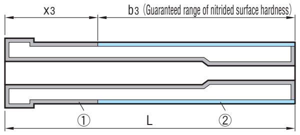
Classification	M	Head Thickness (T)	x_2 max.	Ejector Sleeve·Center Pin Material Hardness		
				①	②	③ (Guaranteed range of base material hardness)
Ejector sleeves	SKH51	T4 (4mm)	0	58～60HRC Overall quenching (no annealing)	58～60HRC Overall quenching (no annealing)	58～60HRC
		JIS (6·8mm)				
Center pins		T4 (4mm)	30	28～35HRC (reference value)	28～60HRC (reference value)	58～60HRC
		JIS (4·6·8mm)	35			
	SKD61	T4 (4mm)	30	28～45HRC (reference value)	28～55HRC (reference value)	50～55HRC
	SKD61 ＋ Nitriding	T4 (4mm)	30	28～45HRC (reference value)	28～45HRC (reference value)	40～45HRC
		JIS (4·6·8mm)	35			
		T10 (10mm)	40			
Ejector sleeves		T4 (4mm) ECB・ECBB	0	37～43HRC (no annealing)	37～43HRC (no annealing)	37～43HRC
		T4 (4mm)	30	28～43HRC (reference value)	28～43HRC (reference value)	37～43HRC
		JIS (4·6·8mm)	35			
		T10 (10mm)	40			

- Annealing was performed on the heads of SKH51 and SKD61 to achieve a level of 30HRC. Annealing was performed on the heads of SKD61＋Nitriding to achieve a level of 40HRC.

■Guaranteed Range of Ejector Sleeve and Center Pin Nitriding and Surface Hardness

Straight Ejector Sleeve

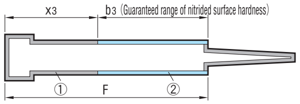
※Cross-sectional view


x3
b3 (Guaranteed range of nitrided surface hardness)
①
L
②

$b_3 \geqq L - x_3$ max.

Center Pin

※Cross-sectional view


x3
b3 (Guaranteed range of nitrided surface hardness)
①
F
②

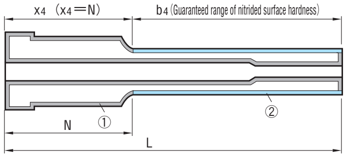
$b_3 \geqq F - x_3$ max.

〔PRODUCT DATA〕

GUARANTEED RANGE AND HARDNESS OF NITRIDING AND SURFACE HARDNESS

Stepped Ejector Sleeves

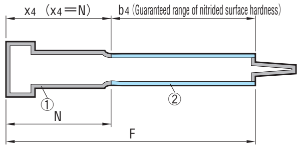
※Cross-sectional view


x4 (x4＝N)
b4 (Guaranteed range of nitrided surface hardness)
N
①
②
L

$b_4 \geqq L - x_4$ $(x_4 = N)$

Stepped Center Pins

※Cross-sectional view


x4 (x4＝N)
b4 (Guaranteed range of nitrided surface hardness)
①
N
②
F

$b_4 \geqq F - x_4$ $(x_4 = N)$

M	Head Thickness (T)	x_3 max.	Ejector Sleeve·Center Pin Surface Hardness	
			①	② (Guaranteed range of nitrided surface hardness)
SKD61 ＋ Nitriding	T4 (4mm) ECB・ECBB	10	Base material hardness (without nitrided layer) ～ 900HV～ (with nitrided layer)	900HV～
	T4 (4mm)	30		
	JIS (4·6·8mm)	35		
	T10 (10mm)	40		

●Nitriding

Nitriding is one of the steel surface treatment methods.
The steel is placed in a furnace that is then filled with nitrogen gas, and at high temperatures (around 500℃) a hardened layer combined with the nitrogen is formed on the surface of the steel.

●Nitrided Depth

This refers to the depth of the hardened layer formed on the surface of the steel by nitriding treatment.
The nitrided depth of MISUMI's 900HV～ plastic mold ejector sleeves/center pins is 0.003～0.008 mm (reference value), and the depth of the hardened layer is 0.1 mm deeper (reference value) than the surface.
The nitrided depth of straight ejector sleeves and center pins is controlled by adjusting nitriding temperature and treatment time in accordance with shaft diameter size.
In the case of stepped ejector sleeves and center pins, nitrided depth is controlled by adjusting nitriding temperature and treatment time in accordance with tip diameter (P) size.
For this reason, the surface hardness of the shaft diameter (D) area is slightly lower at around 500HV (reference value).

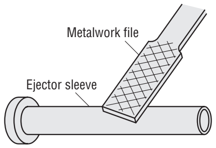
●Ejector Sleeves

The guaranteed range of nitrided surface hardness for ejector sleeves (b_3, b_4) only applies to the outer diameter surface.
The inner diameter surface is outside the guaranteed range of nitrided surface hardness.

●Center Pins

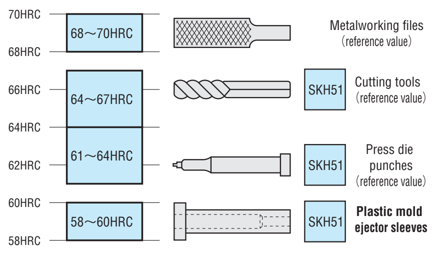
Nitriding has not been done on the tip section of the center pins, in order to prevent chipping.

■Ejector Sleeve·Center Pin Hardness

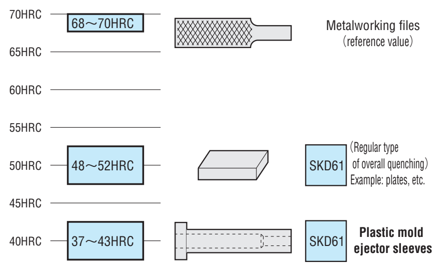

Metalwork file
Ejector sleeve

Normally, it is quite easy to file down an ejector sleeve·center pin using a regular file (metalworking file).
With the SKD61＋Nitriding ejector sleeve/center pin, however, the nitriding treatment makes it difficult to file down, because the file does not bite as easily into the surface. The nitrided layer is several microns thick, so a little pressure should be applied to the file.
※Most regular metalworking files have a hardness of 68 to 70HRC.

M SKH51 (JIS high-speed steel)



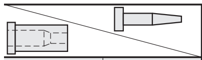
M SKD61 (JIS die steel) prehardened, and nitrided



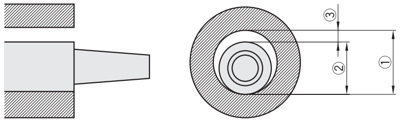
〔PRODUCT DATA〕

EJECTOR SLEEVE AND CENTER PIN COMBINATION

■Ejector Sleeve and Center Pin Combination Example

		**Center Pin Shaft Diameter (DorP) Tolerance**	
		$^{0}_{-0.005}$	**$^{-0.01}_{-0.02}$**
Ejector sleeve hole diameter (V) tolerance	**+0.005** **0** (precision)	○ **Suitable** Because the clearance between the ejector sleeve and center pin is kept to 0.01 mm and below, this is used in cases where the plastic is conducive to the development of burrs, and for precision molds.	○ **Suitable** Because the clearance between the ejector sleeve and the center pin is large, this is used in applications where smooth sliding is required. (※The hole diameter of the ejector sleeve can also be made 0.01 mm larger.)
	+0.01 **0** and **H7**	× **Unsuitable** Combination of the ejector sleeve and the center pins $^{0}_{-0.005}$ shaft diameter tolerance is unsuitable, due to the large contact surface with the center pin. If the same dimensions are designated for hole diameter and shaft diameter. The problems with the pins not fitting the holes,or stopping partially into the holes, or unsmooth sliding movement,may occur .	○ **Suitable** The minimum clearance required for fit between the ejector sleeve and center pin (0.01 mm) can be achieved. This is widely used in general applications, where the plastic is not conducive to the development of burrs.

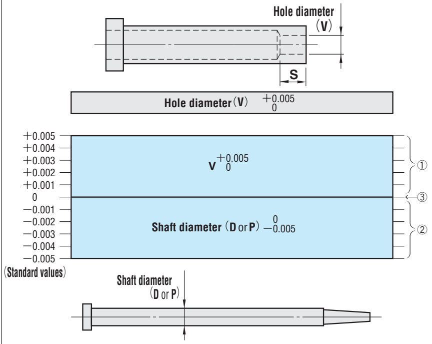
■Ejector sleeve and center pin fit clearance



①…Ejector sleeve hole diameter (V)
②…Center pin shaft diameter (DorP)
③…Ejector sleeve and center pin fit clearance

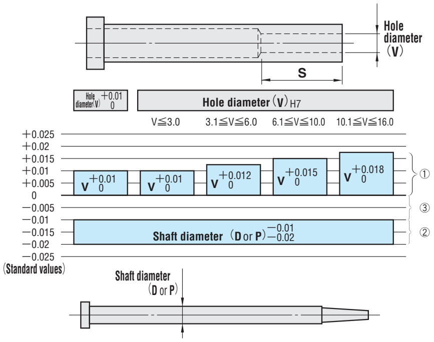
- ●The figure on the left shows sleeve fit, when the same dimensions have been specified for ejector sleeve hole diameter (V) and center pin shaft diameter (DorP).
- ●MISUMI ejector sleeves and center pins are produced separately, with tolerance control exercised on each (with the exception of set products). For this reason, the minimum clearances indicated below are necessary.

●Hole Diameter (V)$^{+0.005}_{0}$ and Shaft Diameter (DorP)$^{0}_{-0.005}$ Combination



①Ejector sleeve hole diameter (V) tolerance range
②Center pin shaft diameter (DorP) tolerance range
③Minimum clearance value (=0) required for the center pin to pass through the ejector sleeve. Refer to "Pass-through Test Standards" in the bottom row.

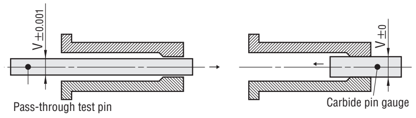
● Hole Diameter (V)$^{+0.01}_{0}$/H7 and Shaft Diameter (DorP)$^{-0.01}_{-0.02}$ Combination



①Ejector sleeve hole diameter (V) tolerance range
②Center pin shaft diameter (DorP) tolerance range
③Minimum clearance value (=0.01mm) required for the center pin to pass through the ejector sleeve.

■Pass-Through Test Standards for the Ejector Sleeve

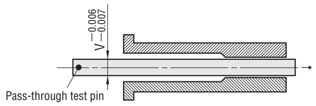
● Hole Diameter (V)$^{+0.005}_{0}$



①**Test using a pass-through test pin** ②**Test using a pin gauge**

●The $^{+0.005}_{0}$ hole diameter (V) ejector sleeve is used in combination with a $^{0}_{-0.005}$ shaft diameter tolerance center pin. Because a $^{0}_{-0.005}$ shaft diameter tolerance center pin must pass through, the sleeve is subjected to a two-stage test, first inserting a ±0.001 (V) pass-through test pin from the head side of the sleeve, and then inserting a ±0 (V) carbide pin gauge from the tip side of the sleeve.

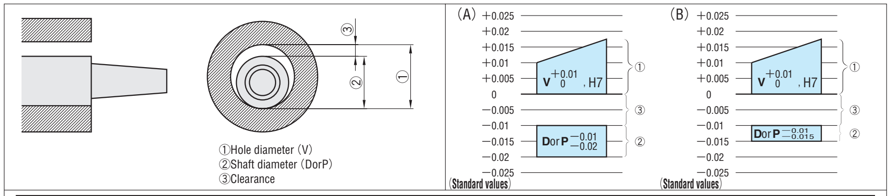
● Hole Diameter (V)$^{+0.01}_{0}$, H7



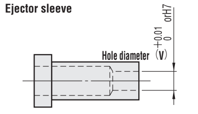
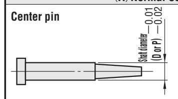
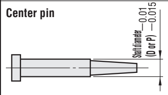
●The $^{+0.01}_{0}$, H7 hole diameter (V) ejector sleeve, with its long sleeve section dimensions, is used in combination $^{-0.01}_{-0.02}$ shaft diameter tolerance center pin. Because a $^{-0.01}_{-0.02}$ shaft diameter tolerance center pin must pass through, the sleeve is tested by inserting a $^{-0.006}_{-0.007}$ (V) pass-through test pin from the head side of the sleeve.

Note that troubles may arise in which $^{0}_{-0.005}$ shaft-diameter tolerance center pins do not fit the holes, the pins stop partially into the holes and sliding is not smooth due to the length of the sleeves section (S) of the ejector sleeves.

■Ejector Sleeve (V $^{+0.01}_{0}$・ H7) Fit Clearance Range (maximum and minimum values)



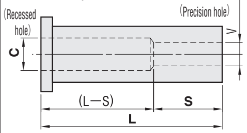
①Hole diameter (V)
②Shaft diameter (DorP)
③Clearance

Ejector sleeve 	**(A) Normal Combination** **Center pin**  (When shaft diameter tolerance is $^{-0.01}_{-0.02}$) Where shaft diameter (DorP) = V is specified		**(B) Combination for Minimizing the Maximum Clearance Values** **Center pin**  (When shaft diameter tolerance is $^{0}_{-0.005}$) for center pins Where shaft diameter (DorP) = (V) −0.01 is specified	
① Hole Diameter Range	**②Shaft Diameter Range**	**③Clearance Range**	**②Shaft Diameter Range**	**③Clearance Range**
V$^{+0.01}_{0}$	(DorP)$^{-0.01}_{-0.02}$	0.01～0.03	(Dor P)$^{-0.01}_{-0.015}$	0.01～0.025
V$^{+0.012}_{0}$		0.01～0.032		0.01～0.027
V$^{+0.015}_{0}$		0.01～0.035		0.01～0.03
V$^{+0.018}_{0}$		0.01～0.038		0.01～0.033

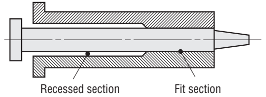
- ●In order to hold the maximum fit clearance values below that of " (A) Normal Combination,"first select a shaft diameter designation (0.01 mm) type of SKH51 $^{0}_{-0.005}$ tolerance straight center pin or stepped center pin, and designate a shaft diameter 0.01 mm smaller than the sleeve's hole diameter (V). This results in a " (B) Combination for Minimizing the Maximum Clearance Values."
- ●The SKD61+Nitriding product group also includes an ejector sleeve and center pin set that holds clearance to under 0.03 mm.

■Ejector Sleeve Recessed Hole (C)

●Ejector sleeve



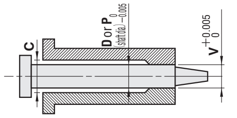
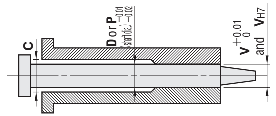
●Cross-sectional view when the center piece is seated



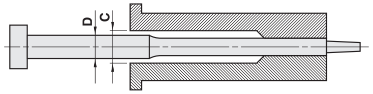
●The ejector sleeves have been designed to be used in combination with the center pins. Smooth sliding will not be possible if the fit section of the hole diameter (V) is too long for the center pin. This is why the length of the hole diameter (V) has been designed to be (S), while the remainder of the length (L −S) is recessed as the recessed hole (C).

●The recessed hole (C) is only applied with rough finishing. The precision standards regard a product acceptable if the corresponding straight center pin is able to pass through the sleeve.

●Precision Standards for the Ejector Sleeve Recessed Hole (C)

	V$^{+0.005}_{0}$	V$^{+0.01}_{0}$ and V H7
Recessed hole (C) precision standards and test methods	 ●Precision standard: When the center pin shaft diameter (DorP) = the sleeve hole diameter (V), the appropriate corresponding straight center pin ($^{0}_{-0.005}$ shaft diameter tolerance) should pass through the sleeve. ●Test method: Inserting a pass-through test pin.	 ●Precision standard: When the center pin shaft diameter (DorP) = the sleeve hole diameter (V), the appropriate corresponding straight center pin ($^{-0.01}_{-0.02}$ shaft diameter tolerance) should pass through the sleeve. ●Test method: Inserting a pass-through test pin. Please note that when a $^{0}_{-0.005}$ shaft diameter tolerance center pin is inserted, there may be instances in which the pin will not pass through the recessed hole (C), even though it passes through the hole diameter (V).
Recess hole (C) size and precision (reference)	C=V+(0.2～0.4) C±0.1 Deflection of C: 0.1mm/100mm(reference value) Concentricity of C against V: 0.2mm(reference value)	C=V+0.5 C±0.1 ※C designation type C≧V+0.5 C±0.1 Deflection of C: 0.1mm/100mm(reference value) Concentricity of C against V: 0.2mm(reference value)

●Precautions when Inserting a Stepped Center Pin's Shaft Diameter (D) into an Ejector Sleeve's Recessed Hole (C)



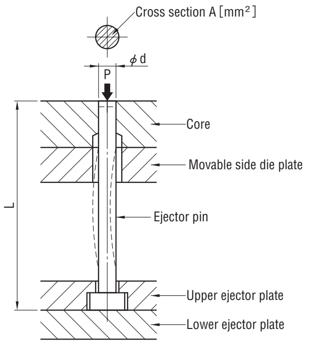
C≧D+1.0 CW≧D+1.0

- ●The precision standard of the recessed hole (C) is tested by inserting the appropriate standard pass-through test pin during pass-through and fit testing. The sole test standard here is whether the appropriate corresponding straight center pin passes through the sleeve hole diameter (V). For this reason, C≧(D+1.0) is necessary in order to be able to insert a stepped center pin's shaft diameter (D) into the recessed hole (C) without problem. Please take note of this.
- ●The 2-stage recessed hole (when using CW codes) is CW ≧(D+1.0).

EJECTOR PIN・EJECTOR SLEEVE STRENGTH CALCULATION

■Ejector Pin・Ejector Sleeve Strength Calculation

Ejector pins and sleeves are subjected to compressive loads when the cavity is filled with molten plastic. When long, thin objects are subjected to such compressive loads, buckling, bending of the pin, or breakage can occur. In order to prevent buckling, we recommend that you select an appropriate configuration by performing strength calculations beforehand.



(1) Computing buckling load P [kgf]:

Euler's formula is normally used to calculate the buckling strength of ejector pins.

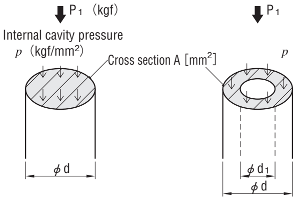
$$P = n\pi^2 AE\left(\frac{K}{L}\right)^2$$

(2) Computing compression load P_1 [kgf]:

Compression load refers to load that is applied to the ejector pin during filling and pressurization with molten plastic.

$$P_1 = p \times A$$

n: terminal condition constant	
For straight	$n=4$
For stepped	$n=2.05$
A: cross section [mm]	
For round	$\frac{\pi}{4}d^2$
For cylinder	$\frac{\pi}{4}(d^2-d_1^2)$
E: modulus of longitudinal elasticity	21000 [kgf/mm²]
K: radius of gyration of area	$K=\sqrt{I/A}$ [mm]
For round	$K=d/4$
For cylinder	$K=\sqrt{d^2+d_1^2/16}$
I: geometrical moment of inertia [mm⁴]	
For round	$I=\frac{\pi d^4}{64}$
For cylinder	$I=\frac{\pi}{64}(d^4-d_1^4)$
p: Internal cavity pressure [kgf/mm²]	



(3) Computing safety factor:

$$S=\frac{P}{P_1}$$

《Considerations regarding safety factor values》: Safety factor (S) is affected by a wide variety of elements, including those listed below.

- Inaccuracy of load estimates・inconsistent strength of materials・effect of heat treatment,
- notch effect・finished surface roughness・abrasion and corrosion during use,
- expansion and contraction due to heat・fatigue・impact mold separation resistance during ejection of the molded object; etc.

In specific terms, we recommend that you decide in advance on an in-company design standard taking into consideration the empirical values of the various companies, and then use this to gauge the appropriateness of the computed results.

■Ejector Pin Strength Calculation Examples

《Example 1》 Straight Ejector Pin

We will examine buckling strength, where an internal cavity pressure of p=4 kgf/mm² is applied to a straight ejector pin with a tip diameter (d) of ϕ2mm, total length (L) of 100 mm

(1) From Euler's formula

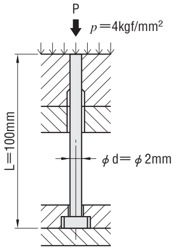
$$\begin{aligned}P&=n\pi^2AE\left(\frac{K}{L}\right)^2\\&=4\times\pi^2\times\frac{\pi\times2^2}{4}\times21000\times\left(\frac{2/4}{100}\right)^2\\&\fallingdotseq65\ \text{(kgf)}\end{aligned}$$

(2) The compression load P_1 exerted on the ejector pin is

$$\begin{aligned}P_1&=p\times A\\&=p\times\frac{\pi d^2}{4}\\&=4\times\frac{\pi\times2^2}{4}\\&\fallingdotseq12.6\ \text{(kgf)}\end{aligned}$$

(3) Therefore, the safety factor (S) is

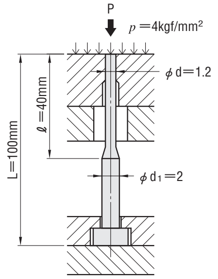
$$S=\frac{P}{P_1}=\frac{65}{12.6}\fallingdotseq5.2$$



<Straight Ejector Pin>

《Example 2》 Stepped Ejector Pin

We will examine buckling strength, where an internal cavity pressure of p=4 kgf/mm² is applied to a stepped ejector pin with a tip diameter (d) of ϕ1.2mm, total length (L) of 100 mm, and a tip section length (ℓ) of 40 mm.



<Stepped Ejector Pin>

(A) Buckling strength calculation for the tip section

(1) From Euler's formura

$$\begin{aligned}P&=n\pi^2AE\left(\frac{K}{\ell}\right)^2\\&=2.05\times\pi^2\times\frac{\pi\times1.2^2}{4}\times21000\times\left(\frac{1.2/4}{40}\right)^2\\&=27.0\ \text{(kgf)}\end{aligned}$$

(2) The compression load P_1 exerted on the ejector pin is

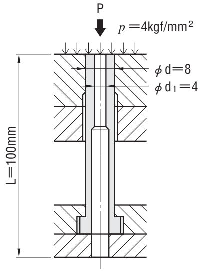
$$\begin{aligned}P_1&=p\times A\\&=p\times\frac{\pi d^2}{4}\\&=4\times\frac{\pi\times1.2^2}{4}\\&=4.5\ \text{(kgf)}\end{aligned}$$

(3) Therefore, the safety factor (S) is

$$S=\frac{P}{P_1}=\frac{27.0}{4.5}\fallingdotseq6.0$$

(B) Buckling strength calculation for the shaft diameter section

As strength calculations for stepped ejector pins are extremely complex, we will make the calculation here assuming a straight ejector pin whose tip diameter is ϕd and length is L.



<Straight Ejector Sleeve>

(1) From Euler's formula

$$\begin{aligned}P&=n\pi^2AE\left(\frac{K}{L}\right)^2\\&=4\times\pi^2\times\frac{\pi\times1.2^2}{4}\times21000\times\left(\frac{1.2/4}{100}\right)^2\\&=8.42\ \text{(kgf)}\end{aligned}$$

(2) The compression load P_1 exerted on the ejector pin is

$$\begin{aligned}P_1&=p\times A\\&=p\times\frac{\pi d^2}{4}\\&=4\times\frac{\pi\times1.2^2}{4}\\&=4.52\ \text{(kgf)}\end{aligned}$$

(3) Therefore, the safety factor (S) is

$$S=\frac{P}{P_1}=\frac{8.42}{4.52}\fallingdotseq1.9$$

■Ejector Sleeve Strength Calculation Examples

《Example 3》 Straight Ejector Sleeve

We will examine buckling strength, where an internal cavity pressure of p=4 kgf/mm² is applied to the straight ejector sleeve shown in the diagram.

(1) From Euler's formula

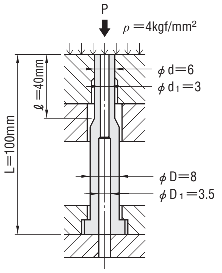
$$\begin{aligned}P&=n\pi^2AE\left(\frac{K}{L}\right)^2\qquad *K=\sqrt{\frac{d^2+d_1^2}{16}}\\&=4\times\pi^2\times\frac{\pi(8^2-4^2)}{4}\times21000\times\left(\frac{\sqrt{(8^2+4^2)/16}}{100}\right)^2\\&=15600\ \text{(kgf)}\end{aligned}$$

(2) The compression load P_1 exerted on the ejector pin is

$$\begin{aligned}P_1&=p\times A\\&=p\times\frac{\pi(d^2-d_1^2)}{4}\\&=4\times\frac{\pi\times(8^2-4^2)}{4}\\&=151\ \text{(kgf)}\end{aligned}$$

(3) Therefore, the safety factor (S) is

$$S=\frac{P}{P_1}=\frac{15600}{151}\fallingdotseq103$$



<Stepped Ejector Sleeve>

《Example 4》 Stepped Ejector Sleeve

We will examine buckling strength, where an internal cavity pressure of p=4 kgf/mm is applied to a stepped ejector sleeve with a tip diameter (d) of ϕ6mm, hole diameter (d_1) of ϕ3 mm, total length (L) of 100 mm, tip section ength (ℓ) of 40 mm, shaft diameter (D) of ϕ3 mm, and recessed hole diameter (D_1) of ϕ3.5 mm.

(A) Buckling strength calculation for the tip section

(1) From Euler's formura

$$\begin{aligned}P&=n\pi^2AE\left(\frac{K}{R}\right)^2\qquad *K=\sqrt{\frac{(d^2+d_1^2)}{16}}\\&=2.05\times\pi^2\times\frac{\pi(6^2-3^2)}{4}\times21000\times\left(\frac{\sqrt{(6^2+3^2)/16}}{40}\right)^2\\&=15810\ \text{(kgf)}\end{aligned}$$

(2) The compression load P_1 exerted on the ejector pin is

$$\begin{aligned}P_1&=p\times A\\&=p\times\frac{\pi(d^2-d_1^2)}{4}\\&=4\times\frac{Q\times(6^2-3^2)}{4}\\&=84.8\ \text{(kgf)}\end{aligned}$$

(3) Therefore, the safety factor (S) is

$$S=\frac{P}{P_1}=\frac{15810}{84.8}\fallingdotseq186$$

(B) Buckling strength calculation for the shaft diameter section

As strength calculations for stepped ejector sleeves are extremely complex, we will make the calculation here assuming a straight ejector sleeve with tip diameters of d and d_1.

(1) From Euler's formula

$$\begin{aligned}P&=n\pi^2AE\left(\frac{K}{L}\right)^2\\&=4\times\pi^2\times\frac{\pi(6^2-3^2)}{4}\times21000\times\left(\frac{\sqrt{(6^2+3^2)/16}}{100}\right)^2\\&=4940\ \text{(kgf)}\end{aligned}$$

(2) The compression load P_1 exerted on the ejector pin is

$$\begin{aligned}P_1&=p\times A\\&=p\times\frac{\pi(d^2-d_1^2)}{4}\\&=4\times\frac{\pi\times(6^2-3^2)}{4}\\&=84.7\ \text{(kgf)}\end{aligned}$$

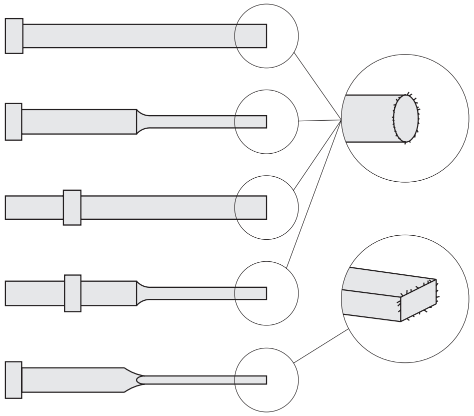
(3) Therefore, the safety factor (S) is

$$S=\frac{P}{P_1}=\frac{4940}{84.7}\fallingdotseq58.3$$

〔PRODUCT DATA〕

FINISHING OF EJECTOR PINS AND CORE PIN TIPS
FINISHING OF CORNERS OF RECTANGULAR EJECTOR PINS

■Finishing of tips and edges



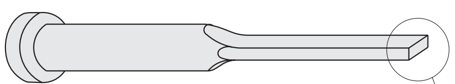
When ejector pins and core pins are processed to determine the total length, fine, processing burring about 0.02～0.05mm(reference values)in length occurs at the edge of the tip. When this burring is removed, a slight sag results.

MISUMI does not process the tip in order to prevent sagging.

The allowable sag R depends on a variety of conditions such as the particular mold being used(precision of mold, characteristics of the formed object, shape, resin type). For this reason, the sag R caused by deburring may be an issue. Use an oilstone, sandpaper, cloth, etc to remove the burring according the precision control standards on your design drawing of the mold being used.

On general purpose machinery, it is common to use slight chamfering(C about 0.1～0.3), but as the tips of the ejector pin and core pin come in contact with the formed object, chamfering is generally not carried out or kept to a minimum.

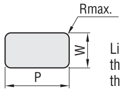
■Finishing of corners of rectangular ejector pins



For rectangular ejector pins, P and W dimensions cannot be measured if there is burring, so remove the burring from the corners. As a result, a maximum of 0.03mm of burring R occurs. However, the deburring of edges is not carried out.

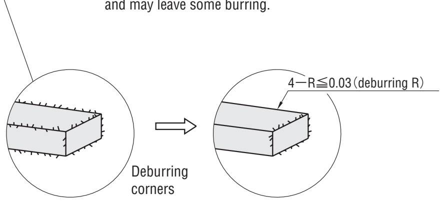
❢This deburring is for measuring the P and W dimensions and may leave some burring.

R value for tip



Rmax.≦0.03(deburring R)

Light deburring is carried out on the corners of the tip to measure the P and W dimensions.



●**Hints and tips**

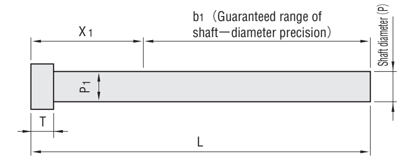
About processing burring:	When cutting(with a blade)or grinding(with a grinding stone)steel, small splinter shaped burrs occur on the edge of the processed surface. For example, just like splinters occur when wood is cut with a saw, similar small splinters occur when processing metal. These splinters are called burrs. In general, the size of the burrs is smaller for harder materials. On the other hand, the pieces of material that melts and is caught in gaps during casting, die-casting, and molding of plastics are called flash. In English, the burrs caused in processing are called BURRs, while those cause in molding are called FLASH, or FIN. Reference: Zukai Kikai Yougo Jiten(Illustrated Dictionary of Machinery), THE NIKKAN KOGYO SHIMBUM, LTD.

〔PRODUCT DATA〕

COMPARISON OF GUARANTEED RANGE OF SHAFT-DIAMETER PRECISION BETWEEN EJECTOR PINS AND CORE PINS
DESIGNATION METHOD AND PRECISION OF KEY FLAT CUTTING OF EJECTOR PINS AND CORE PINS

■Comparison of Guaranteed Range of Shaft Diameter Precision between Ejector Pins and Core Pins

Ejector pins



Guaranteed range of shaft-diameter precision

$b_1 \geqq L - X_1\text{max.}$

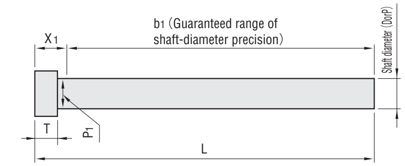
X_1 dimensions

Ejector pins		X_1max.
L≦150	T4(4mm)	30
	JIS(4·6·8mm)	35
	T10 (10mm)	40
L＞150	X_1max.varies depending on the L dimension. For details refer to P.1669	

P_1 Precision

Shaft diameter(P) Precision	P_1 Precision
$P^{\ 0}_{-0.002}$	$P_1{}^{\ 0}_{-0.1}$
$P^{\ 0}_{-0.005}$	$P_1{}^{\ 0}_{-0.1}$
$P^{-0.01}_{-0.02}$	$P_1{}^{-0.01}_{-0.1}$

Core pins



Guaranteed range of shaft-diameter precision

$b_1 \geqq L - X_1\text{max.}$

X_1 dimensions

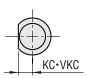
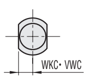
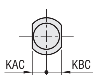
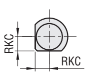
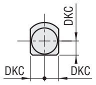
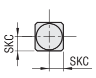
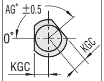
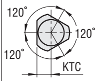
Core pins	X_1max.	
	L＜10	L≧10
Standard	T(TC)＋1.5	T(TC)＋4
Precision Extra precision	T(TC)＋1	T(TC)＋2

P_1 Precision

Shaft diameter precision	P_1 Precision
Shaft diameter $^{\ 0}_{-0.003}$	$P_1{}^{\ 0}_{-0.05}$
Shaft diameter $^{\ 0}_{-0.005}$	$P_1{}^{\ 0}_{-0.05}$
Shaft diameter $^{-0.01}_{-0.02}$	$P_1{}^{-0.01}_{-0.06}$

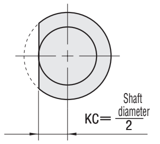
■Designation Method and Precision of Key Flat Cutting of Ejector Pins and Core Pins

- **Method of key flat cutting**

Key flat cutting	Single flat	Two flats(parallel)	Two flats (different dimensions)	Two flats(right angled)	Three flats	Four flats	Two flats(angled)	Three flats(at 120°)
Code	KC VKC	WKC VWC	KAC KBC	RKC	DKC	SKC	KGC	KTC
Alterations	 KC·VKC	 WKC· VWC	 KAC KBC	 RKC RKC	 DKC DKC DKC	 SKC SKC	 AG° ±0.5 0° KGC KGC	 120° 120° 120° KTC
Range of designation	$\frac{\text{Shaft diameter}}{2}\leqq\begin{matrix}KC\\VKC\end{matrix}<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq\begin{matrix}WKC\\VWC\end{matrix}<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq KAC$ $KAC<KBC<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq RKC<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq DKC<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq SKC<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq KGC<\frac{\text{Head diameter}}{2}$	$\frac{\text{Shaft diameter}}{2}\leqq KTC<\frac{\text{Head diameter}}{2}$

①

Designated according to shaft diameter



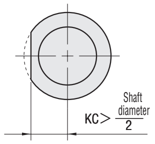
When designated according to shaft diameter,

in order to designate the shaft diameter$\times\frac{1}{2}$

Shaft diameter selection type	→ 0.05mm increments possible
Shaft diameter designation (0.01mm increments) type	→ 0.005mm increments possible
Shaft diameter designation (0.005mm increments) type	→ 0.0025mm increments possible
Shaft diameter designation (0.001mm increments) type	→ 0.0005mm increments possible

②

Designated with free dimensions (outside the shaft diameter)



When designated using free dimensions

Designation is only in 0.1mm increments

Precision of key flat cutting

①When key flat cutting is designated according to shaft diameter.

Category	Key flat cutting tolerance
Ejector pins	$^{\ 0}_{-0.1}$
Ejector pins alterations VKC·VWC·VAK·VAW	$^{\ 0}_{-0.02}$
Core pin shaft diameter tolerance $^{\ 0}_{-0.003}$	$^{\ 0}_{-0.01}$
Core pin shaft diameter tolerance $^{\ 0}_{-0.005}$	
Core pin shaft diameter tolerance $^{-0.01}_{-0.02}$	

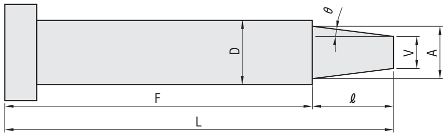
②When designated with free dimensions

Category	Key flat cutting tolerance
Ejector pins	$^{\ 0}_{-0.1}$
Ejector pins alterations VKC·VWC	$^{\ 0}_{-0.02}$
Core pin shaft diameter tolerance $^{\ 0}_{-0.003}$	$^{\ 0}_{-0.01}$
Core pin shaft diameter tolerance $^{\ 0}_{-0.005}$	
Core pin shaft diameter tolerance $^{-0.01}_{-0.02}$	

〔PRODUCT DATA〕

METHODS FOR COMPUTING ONE-STEP CORE PIN DIMENSIONS

■Round Core Pins: Computing the Gradient θ of the Shaped Section



	Step 1A	Step 1B · 1E	Step 1C	Step 1D
Gradient θ computation	$\theta=\tan^{-1}\frac{D-V}{2\ell}$	$\theta=\tan^{-1}\frac{A-V}{2\ell}$	$\theta=\tan^{-1}\frac{A-V}{2\ell-D+A}$	$\theta=\tan^{-1}\frac{A-V}{2(\ell-C)}$
V dimension computation	$V=D-2\ell\tan\theta$	$V=A-2\ell\tan\theta$	$V=A-(2\ell-D+A)\tan\theta$	$V=A-2(\ell-C)\tan\theta$

❢For the shaft diameter designation (0.01 mm increments) type, calculate using P for D.
Calculation of $\tan^{-1}$ (arc tangent) is simple using a function calculator.

● How to derive the $\tan^{-1}$ (arc tangent) value from the trigonometric function antilogarithm table

■To find $\tan^{-1}(x)$, please refer to the trigonometric function antilogarithm table on ☞ P.1711.

When the x of $\tan^{-1}(x)$ is less than or equal to 1

①Locate the tan θ antilogarithm column from among the trigonometric functions listed in the top section of the antilogarithm table, then proceed down the column until you find the relevant value.

②The angle for θ in the left—hand column for that value will be equal, for the most part, to the calculated value for $\tan^{-1}$.

(ex.) $\tan^{-1}(0.0875)\fallingdotseq 5°\ 00'$
$\tan^{-1}(0.0850)=4°\ 50'\sim 5°\ 00'$

When the x of $\tan^{-1}(x)$ is greater than or equal to 1

①Locate the tan θ antilogarithm column from among the trigonometric functions listed in the bottom section of the antilogarithm table, then proceed up the column until you find the relevant value.

②The angle for θ in the right-hand column for that value will be equal, for the most part, to the calculated value for $\tan^{-1}$.

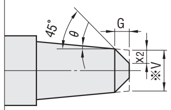
(ex.) $\tan^{-1}(1.4281)\fallingdotseq 55°\ 00'$
$\tan^{-1}(1.4315)=55°\ 00'\sim 55°\ 10'$

θ	When deg =0° 00' ～11° 50'				
deg	sin θ	cos θ	tan θ	cot θ	
0° 00'	.0000	1.0000	.0000	∞	90° 00'
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
30	.0785	.9969	.0787	12.706	30
40	.0814	.9967	.0816	12.251	20
50	.0843	.9964	.0846	11.826	10
5° 00'	.0872	.9962	.0875	11.430	85° 00'
10	.0901	.9959	.0904	11.059	50
20	.0929	.9957	.0934	10.712	40

30	.5664	.8241	.6873	1.4550	30
40	.5688	.8225	.6916	1.4460	20
50	.5712	.8208	.6959	1.4370	10
35° 00'	.5736	.8192	.7002	1.4281	55° 00'
10	.5760	.8175	.7046	1.4193	50
20	.5783	.8158	.7089	1.4106	40
30	.5807	.8141	.7133	1.4019	30
40	.5831	.8124	.7177	1.3934	20
50	.5854	.8107	.7221	1.3848	54° 10'
	cos θ	sin θ	cot θ	tan θ	deg
	When deg =54° 10' ～66° 00'				θ

Reference Data: Method for Computing Dimensions During Tip Shape Selection (※V is the dimension prior to tip shape processing.)

C (Chamfering)



G=Standard : 0.1mm increments
Precision•Extra precision : 0.05mm increments

$0.5\leqq G<\frac{V}{2}$

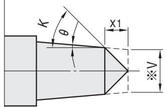
$\theta<45°$

$x_2=G(1-\tan\theta)$

Processing limit value α for ℓ : α=G

$\theta=0°$ ···▸ $G=x_2$
$\theta>0°$ ···▸ $G>x_2$

G (Cone cutting)



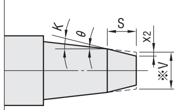
K=1° increments

$20<K\leqq 60$ and $\theta=K$

$x_1=\frac{V}{2(\tan K-\tan\theta)}$

Processing limit value α for ℓ :
$\alpha=\frac{V}{2\tan K}$

T (Tapering)



S=Standard : 0.1mm increments
Precision•Extra precision : 0.05mm increments

$0.1\leqq S<\frac{V}{2\tan K}$

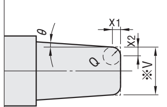
K=1° increments

$10\leqq K\leqq 45$ and $\theta<K$

$x_2=S(\tan K-\tan\theta)$

Processing limit value α for ℓ : α=S

R (Rounding)



Q=0.1 mm increments

$0.2\leqq Q\leqq V/2$

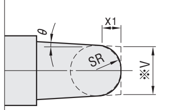
$x_1=Q(1=\sin\theta)$

$x_2=Q\{1-(1-\sin\theta)\tan\theta\}$

Processing limit value α for ℓ : α=Q

$\theta=0°$ ···▸ $Q=x_1=x_2$
$\theta>0°$ ···▸ $Q>x_1>x_2$

B (Spherical R)



SR=automatically determined.

SR±0.1

❢The spherical shape of the tip is not a perfect sphere.

$$SR=\frac{\ell\cdot\tan\theta-\frac{A}{2}}{(1-\sin\theta)\cdot\tan\theta-\cos\theta}$$

$x_1=SR(1-\sin\theta)$

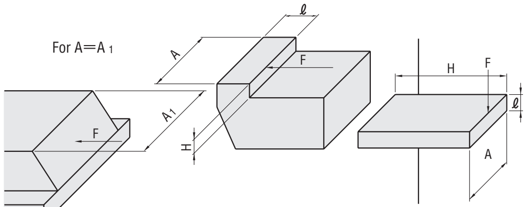
Processing limit value α for ℓ : $\alpha=\frac{V}{2}$

$\theta=0°$ ···▸ $SR=x_1$
$\theta>0°$ ···▸ $SR>x_1$

〔PRODUCT DATA〕

STRENGTH OF INLAY SECTION OF LOCKING BLOCKS-POSITIONING TYPE-RELATIONSHIP BETWEEN WEDGE ANGLE AND CLEARANCE

■Strength of Positioning Type Locking Block Inlay Sections



Considering the force acting on the inlay section to be cantilever

Bending Moment

$M\text{max.}=F\cdot H$

Section Modules

$Z=\frac{A\cdot\ell^2}{6}$

Allowable Stress

$\sigma_b=\frac{M\text{max.}}{Z}=\frac{F\cdot H}{Z}$

$F=\frac{\sigma_b\cdot Z}{H}=\frac{\sigma_b\cdot A\cdot\ell^2}{6\times H}$ {maximum stress}

ex
A =25mm
ℓ =10mm
H =4mm, then

When the material is steel
σ_b=1200～1800kgf/cm² {11760～17640N/cm²}
Assuming that
σ_b=1200kgf/cm² {11760N/cm²}

$$F=\frac{1200\times 2.5\times 1^2}{6\times 0.4}=\frac{3000}{2.4}=1250\text{kgf}\ \{12250\text{N}\}$$

Assuming stress concentrating factor α =2.5
{α =2.5when inlay corner area R is close to 0}

$$F=\frac{1250}{2.5}=500\text{kgf}\ \{4900\text{N}\}$$

①Inlay height H

The below table shows that the longer H is,
the lower maximum stress a locking block can endure.

H	F {maximum stress} kgf {N}	Strength coefficient
4	1250 {12258}	100
5	1000 {9800}	80
6	833 {8163}	67
7	714 {6997}	57
8	625 {6125}	50
9	556 {5449}	44
10	500 {4900}	40

②Inlay length ℓ

In the above case, maximum stress F_1, when ℓ is lengthened from 10 mm to 12 mm, is:

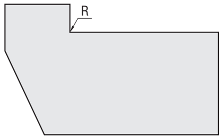
$$F_1=\frac{1200\times 2.5\times 1.2^2}{6\times 0.4}=\frac{4320}{2.4}=1800\text{kgf}\ \{17640\text{N}\}$$

$\ell=10$ ···▸ 12 $\frac{F_1}{F}=\frac{1800}{1250}=1.44$

The calculation indicates that the strength of the inlay section is 1.44 times greater.

③Inlay corner area R

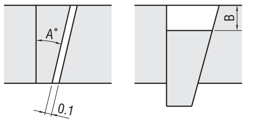
The larger R is, the smaller α (stress concentrating factor) becomes.
Therefore, the maximum stress exerted on the locking block increases.



Large R ⟷ Small R
$1\leqq\alpha\leqq 3$

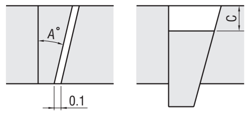
■Relationship Between Wedge Angle and Clearance

Sinking quantity of the wedge cut 0.1mm to inclined plane with an angle of A°



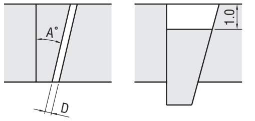
A	B	A	B	A	B	A	B
0° 30′	11.460	7°	0.820	16°	0.360	25°	0.240
1°	5.730	8°	0.720	17°	0.340	26°	0.230
1° 30′	3.820	9°	0.640	18°	0.320	27°	0.220
2°	2.870	10°	0.580	19°	0.310	28°	0.210
2° 30′	2.290	11°	0.520	20°	0.290	29°	0.210
3°	1.910	12°	0.480	21°	0.280	30°	0.200
4°	1.430	13°	0.440	22°	0.270	35°	0.170
5°	1.150	14°	0.410	23°	0.260	40°	0.160
6°	0.960	15°	0.390	24°	0.250	45°	0.140

Sinking quantity of the inclined plane when wedge sinking 0.1mm with an angle of A°



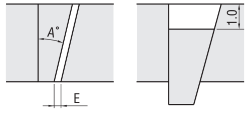
A	C	A	C	A	C	A	C
0° 30′	11.460	7°	0.810	16°	0.350	25°	0.210
1°	5.730	8°	0.710	17°	0.330	26°	0.200
1° 30′	3.820	9°	0.630	18°	0.310	27°	0.200
2°	2.860	10°	0.570	19°	0.290	28°	0.190
2° 30′	2.290	11°	0.510	20°	0.270	29°	0.180
3°	1.910	12°	0.470	21°	0.260	30°	0.170
4°	1.430	13°	0.430	22°	0.250	35°	0.140
5°	1.140	14°	0.400	23°	0.240	40°	0.120
6°	0.950	15°	0.370	24°	0.220	45°	0.100

Cutting quantity of the wedge cut 1.0mm to inclined plane with an angle of A°



A	D	A	D	A	D	A	D
0° 30′	0.009	7°	0.122	16°	0.276	25°	0.423
1°	0.017	8°	0.139	17°	0.292	26°	0.438
1° 30′	0.026	9°	0.156	18°	0.309	27°	0.454
2°	0.035	10°	0.174	19°	0.326	28°	0.469
2° 30′	0.044	11°	0.191	20°	0.341	29°	0.485
3°	0.052	12°	0.208	21°	0.358	30°	0.500
4°	0.080	13°	0.225	22°	0.375	35°	0.574
5°	0.087	14°	0.242	23°	0.391	40°	0.643
6°	0.105	15°	0.259	24°	0.407	45°	0.707

Cutting quantity of the inclined plane when wedge sinking 1.0mm with an angle of A°



A	E	A	E	A	E	A	E
0° 30′	0.009	7°	0.123	16°	0.287	25°	0.466
1°	0.017	8°	0.140	17°	0.306	26°	0.488
1° 30′	0.026	9°	0.158	18°	0.325	27°	0.510
2°	0.035	10°	0.176	19°	0.344	28°	0.532
2° 30′	0.044	11°	0.194	20°	0.364	29°	0.554
3°	0.052	12°	0.212	21°	0.384	30°	0.577
4°	0.070	13°	0.231	22°	0.404	35°	0.700
5°	0.087	14°	0.249	23°	0.424	40°	0.839
6°	0.105	15°	0.268	24°	0.445	45°	1.000

〔PRODUCT DATA〕

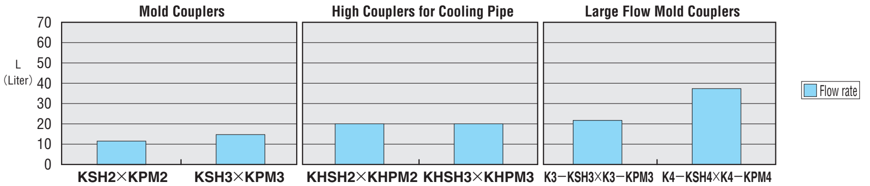
FLOW RATE WHEN 98KPA FOR MOLD COUPLERS

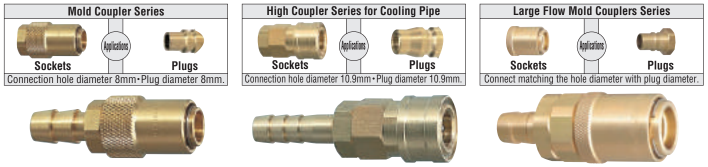
〔PRODUCT DATA〕

①GRAPH OF FLOW RATE AND PRESSURE LOSS CHARACTERISTICS FOR MOLD COUPLERS

■Single Valve Type　Flow Rate when 98kPa（L/min.）

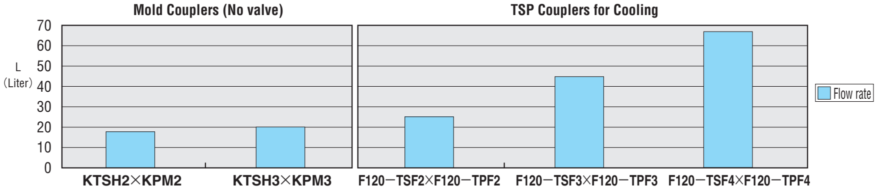
Single valve type is of the couplers series, which has an automatic open/close valve only on the socket side.

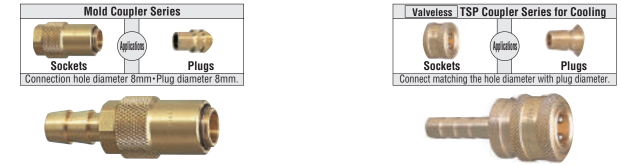



Mold Coupler Series
Sockets
Applications
Plugs
Connection hole diameter 8mm•Plug diameter 8mm.
High Coupler Series for Cooling Pipe
Sockets
Applications
Plugs
Connection hole diameter 10.9mm•Plug diameter 10.9mm.
Large Flow Mold Couplers Series
Sockets
Applications
Plugs
Connect matching the hole diameter with plug diameter.

■ Valveless Type　Flow Rate when 98kPa（L/min.）

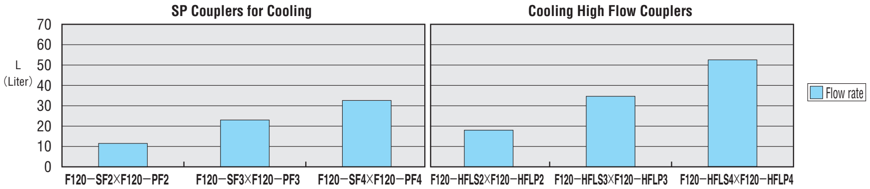
Valveless type is a coupler series that there is no automatic open/close valve in either the socket or plug.

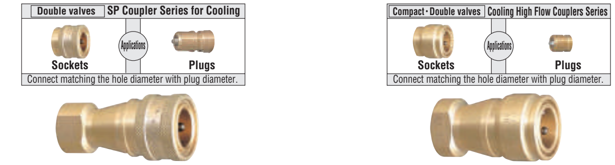



Mold Coupler Series
Sockets
Applications
Plugs
Connection hole diameter 8mm•Plug diameter 8mm.
Valveless
TSP Coupler Series for Cooling
Sockets
Applications
Plugs
Connect matching the hole diameter with plug diameter.

■ Double Valves Type　Flow Rate when 98kPa（L/min.）

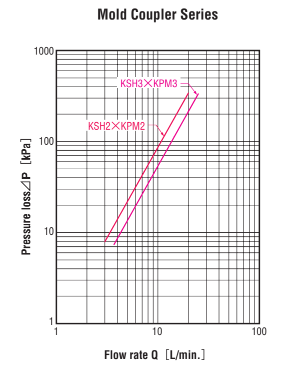
Double valves type is a coupler series that there are automatic open•close valve in socket and plug respectively.

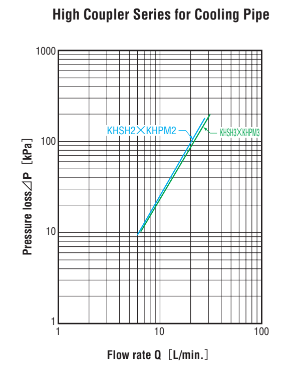


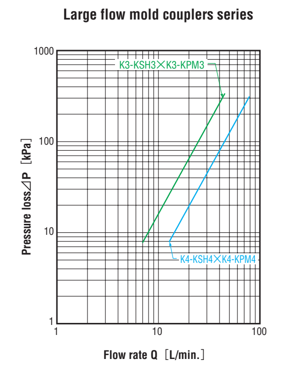

Double valves
SP Coupler Series for Cooling
Sockets
Applications
Plugs
Connect matching the hole diameter with plug diameter.
Compact•Double valves
Cooling High Flow Couplers Series
Sockets
Applications
Plugs
Connect matching the hole diameter with plug diameter.

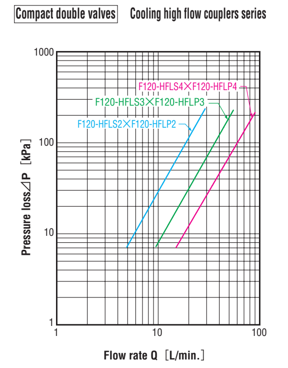
Graphs of flow rate for 98kPa indicate the flow（L: liter）in 1 minute when the water flows under the hydraulic pressure of 98kPa（about 1kgf/cm^2）.
（Fluid in measurement: water, temperature:10℃±3℃,direction of flow:socket→plug） Shown are examples of measurement values and are not guaranteed values.

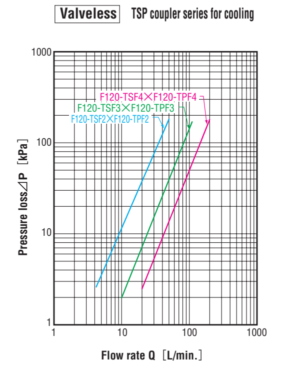
■Graph of Flow Rate and Pressure Loss Characteristics

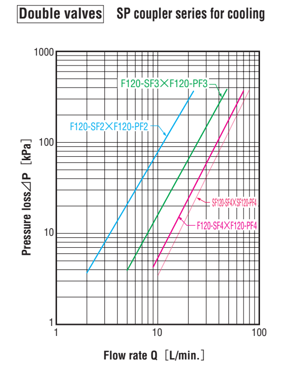


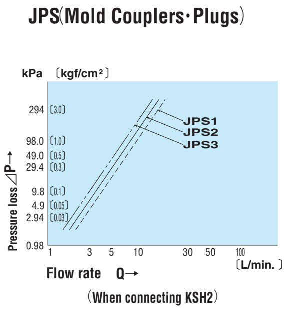




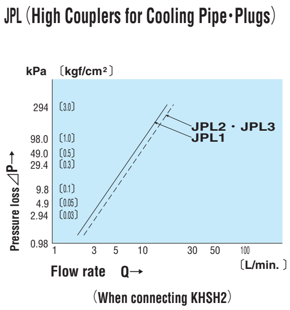




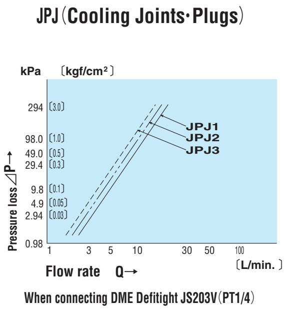




（When connecting KSH2）



（When connecting KHSH2）



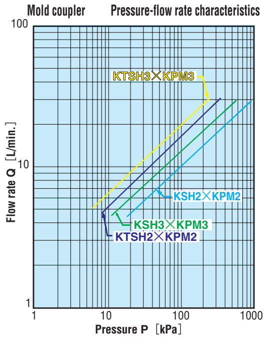
When connecting DME Defitight JS203V（PT1/4）

The Graphs of flow rate and pressure loss indicate the flow rate Q（L/min.）and pressure loss　P when the cooling water flows.
（Fluid in measurement: water, temperature: room temperature, direction of flow: socket→plug）
Shown are examples of measurement values and are not guaranteed values.

〔PRODUCT DATA〕

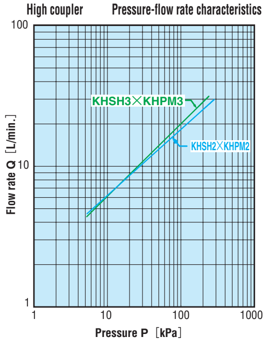
②GRAPH OF FLOW RATE AND PRESSURE LOSS CHARACTERISTICS FOR MOLD COUPLERS

■Mold Coupler Series



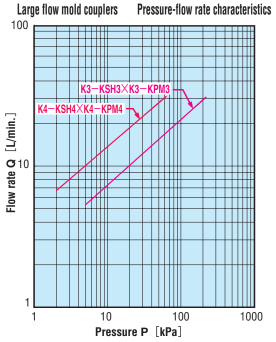
P.1049～

■High Coupler Series for Cooling Pipe



P.1053～

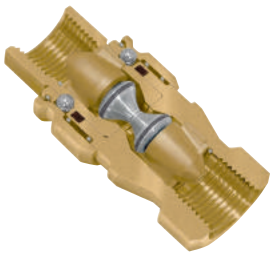
■Large Flow Mold Couplers Series

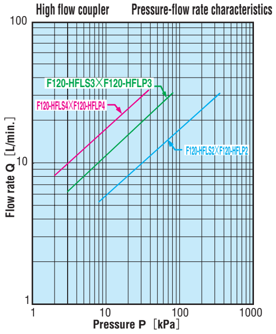


P.1061～

Graphs of pressure-flow rate characteristics indicate the pressure P (kPa) and flow rate Q (L/min.) when the cooling water flows.
（Fluid in measurement: water,temperature:10℃±3℃,direction of flow:socket→plug） Shown are examples of measurement values and are not guaranteed values.

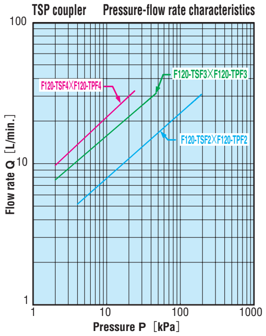
■ Compact double valves Cooling High Flow Couplers Series





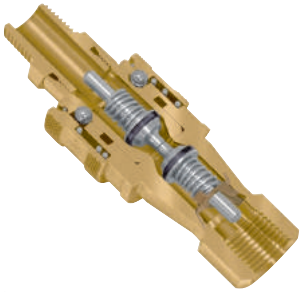
P.1063～

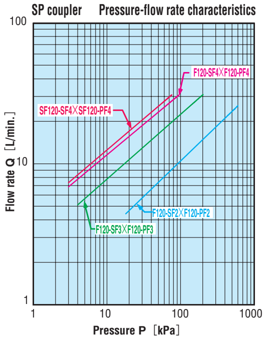
■ Valveless TSP Coupler Series for Cooling



P.1060～

■ Double valves SP Coupler Series for Cooling





P.1062～

Graphs of pressure—flow rate characteristics indicate the pressure P（kPa）and flow rate Q（L/min.）when the cooling water flows.
（Fluid in measurement: water,temperature:10℃±3℃,direction of flow:socket→plug） Shown are examples of measurement values and are not guaranteed values.

〔PRODUCT DATA〕

CALCULATING HEATER CAPACITY REQUIREMENTS / JIS TYPE TAPERED SCREWS

■Calculating Heater Capacity Requirements

■Formula

$$\text{Heater capacity \{kW\}} = \frac{W_1(\text{kg}) \times C(\text{kcal/m} \cdot \text{h} \cdot ℃) \times (T1 - T2)}{860 \times h\ (\text{Hour}) \times \eta\,(\text{efficiency})}$$

W_1(kg): total weight of the heated section　　C(kcal/m・h・℃): specific heat　T1(℃): risen temperature　T2(℃): ambient temperature

860: 1kWh=860kcal　　h(Hour): heating time　　η (efficiency): an effective percentage contributing to heating

Example)　Suppose that an entire mold is controlled by the heater, and that the weight of the mold is 130 kg, the ambient temperature is 21℃, the target temperature of the mold is 110℃, and heating time is 30 minutes. The heater capacity that is required for the mold in this case is calculated as follows.

$$\frac{130 \times 0.11 \times (110 - 21)}{860 \times 0.5(\text{h}) \times ※0.5} \fallingdotseq 6\ \{\text{kW}\}$$

(※Efficiency is assumed to by 0.5.)

$W_1 = 130$(kg)
$C = 0.11$(kcal/h・m・℃)
$T1 = 110$(℃)
$T2 = 20$(℃)
$h = 0.5$(30minutes)
η (efficiency) $= 0.5$

■Heater Selection

Suppose a mold size of 230×270 and the outside diameter of the heater to be used as ϕ12.6 and it's length as 250 mm. The wattage of the MCH12.6—250 is 950W. Therefore the required number of heaters would be

$$6000\text{W} \div 950\text{W} \fallingdotseq 6\ (\text{heaters}).$$

This was a rather simple example. In actual practice, it is difficult to compute η (efficiency); it is necessary to raise η (efficiency) by insulating the heated area and through uniform positioning of the heaters. Generally, a value between 0.2 to 0.5 is appropriate for η (efficiency). In addition, please be aware of the fact that temperature and heat are entirely different things.

■Terminology

Specific heat: With a unit of (kcal/h・m・℃), it is the amount of heat required to raise the temperature of mass m by 1℃ within the specified time unit.
If the temperature of a mass m, specific heat C(kcal/h・m・℃) object rises by t (℃), with absorbed heat of Q(kcal), the relationship would be
$Q = m \cdot C \cdot t$

■Tapered External Threads for JIS Tubing—Differences in Appearance Stemming from Processing Methods—(reference data)

①Thread produced by rolling

※The above photo shows
MISUMI MSWT(PT 1/4) screw plug.

- ●Processing of external thread by rolling is normally used in mass-production (reference volume: several tens of thousand units).

②Thread produced by NC lathes

※The above photo shows
MISUMI standard type JPS (PT 1/4) Cooling-use Plug.

- ●Processing of external thread by NC lathes is normally used in semi mass-production (reference volume: several hundred units and above).

③Thread produced by dies

※The above photo shows
MISUMI long type LJPS (PT 1/4) Cooling-use Plug.

- ●Processing of external thread by dies is normally used in large-variety, small-Lot production (reference volume : 1 unit and above).

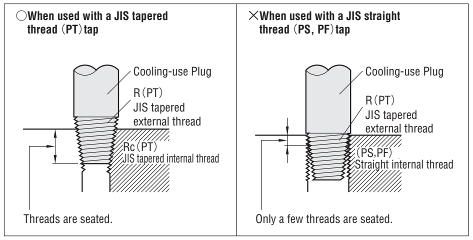
●The appearance of the various types of external threads may differ somewhat depending on the method of production employed; however, all conform to standards for use with JIS tubes (in accordance with JIS screw gauge testing).
Normally, the order of difficulty of hand tightening screws using these tapered threads is ①→②→③, with ① being comparatively the easiest and ③ being comparatively the most difficult to hand tighten. All can be tightened with Allen wrenches without problem using the proper torque.

❢Note that hand tightening alone may lead to water leakage.

〔PRODUCT DATA〕

COOLING-USE PLUG ATTACHMENT THREADS

■Explanation of Cooling-use Plug Attachment Threads



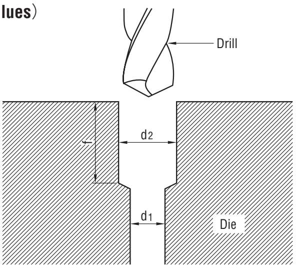
○When used with a JIS tapered thread (PT) tap
Cooling-use Plug
R(PT)
JIS tapered external thread
Rc(PT)
JIS tapered internal thread
Threads are seated.
×When used with a JIS straight thread (PS, PF) tap
Cooling-use Plug
R(PT)
JIS tapered external thread
(PS,PF)
Straight internal thread
Only a few threads are seated.

- ● Please tap the thread using a tap meant for JIS tapered thread (PT).
- ● Please note that tapping the thread with a straight thread tap meant for use with (PS, PF) will result in only several threads being seated when the joint plug is screwed in, as shown in the illustration, which could lead to leakage of water.
- ● Please note that the (NPT) tapered thread for use with American tubing has a different number of threads than the (PT) tapered thread for use with JIS tubing, making them completely incompatible.

■Dimensions of The Prepared Hole for JIS Tapered Internal Threads (reference values)

Size (No.)	Tapered thread (PT)	Prepared hole depth (f)	Prepared holediameter-recommended value (d2)	① Unsuitable　② Dangerous　③ Optimum　④ Dangerous　⑤ or greater
1	PT 1/8	17 or greater	8.5	Recommended value 8.0　8.1　8.2　8.3　8.4　8.5　8.6　8.7　8.8
2	PT 1/4	25 or greater	11.4	Recommended value 10.8　10.9　11.0　11.1　11.2　11.3　11.4　11.5　11.6　11.7
3	PT 3/8	25 or greater	14.9	Recommended value 14.2　14.3　14.4　14.5　14.6　14.7　14.8　14.9　15.0　15.1　15.2

①Unsuitable: Unsuitable for setting up the tap because the prepared hole is too small.
②Dangerous: Damage to the tap when setting it up occurs with great frequency because the prepared hole is small. Setting up the tap requires a high level of skill and technique, and painstaking care; because of the danger, therefore, this cannot be recommended.
③Optimum: The prepared hole is the ideal size for tapping.
④Dangerous: It is not possible to tap a thread that conforms to JIS standards because the prepared hole is large; and the probability of water leakage problems occurring is high. Setting up the tap requires a high level of skill and technique, and painstaking care; because of the danger, therefore, this cannot be recommended.
⑤Unsuitable: Unsuitable for setting up the tap because the prepared hole is too large.
※Sizes at which problems occur at a high frequency rate, even when tapped by a skilled technician exercising painstaking caution, have been classified "unsuitable," although they may fall within the realm of theoretical possibility.



Prepared internal thread hole diameter (d_2) ≧ Water hole diameter (d_1)

Regarding dimensions of prepared holes for internal threading, JIS recommends "setting prepared hole dimension based on thread seating," but does not delineate a recommended value for the hole.
"Dimensions of the Prepared Hole for JIS Tapered Internal Threads" are values that MISUMI has investigated and prepared on its own, using plastic mold/cooling-use plug female screw joint threading as a point of reference.

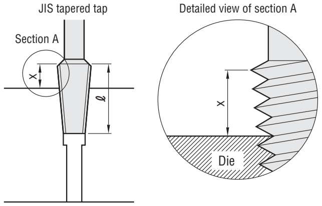
Mold Division, MISUMI.

■Simple Test Method for JIS Tapered Internal Threads (reference data)

Size (No.)	Tapered thread (PT)	JIS Tapered Tap Blade Length (ℓ) (from JIS B4446)		x
		Regular Type (for long threads)	Short-Thread Type (for short threads)	
1	PT 1/8	19	16.5	6±1.13
2	PT 1/4	28	19.5	7±1.67
3	PT 3/8	28	21.0	7±1.67

- ●It is possible to confirm that the amount of thread-cut is proper and that the thread is in conformance with JIS standards, where a JIS-standard (B4446) tapered tap is used to achieve a condition in which dimension x is left from the maximum diameter of the tap thread ridge.
- ●Dimension x is the same, regardless of whether a regular or short JIS-type tapered tap is used. Please note that use of a tapered tap with a blade length (ℓ) that does not conform with JIS standards may result in a change in dimension x. For details, please consult the user's manual, catalog and other material for the tap you are using.

※If dimension x is long, the amount of the tap thread-cut will become small. Please note that this will result in a smaller thread-seating area, which may result in water leakage. Note that screwing in the male threaded screw too tightly may damage the threads and result in water leakage.
※If dimension x is short, the amount of the tap thread-cut will become large. Note that this will result in the internal thread becoming wider than JIS standards, which may result in water leakage.
※Dimension x can be used as a guide for tap thread-cut dimensions; however, we recommend for safety's sake that you inspect and test after tapping.



Regarding testing after finish processing of tapered internal threads, JIS recommends confirmation "using a JIS-standard testing gauge (B0253)."
"Simple Test Method for JIS Tapered Internal Threads" was researched and developed by MISUMI for use as a guideline for simplified testing following internal thread-cut processing of joint plugs for use with plastic molds and for cooling-use.

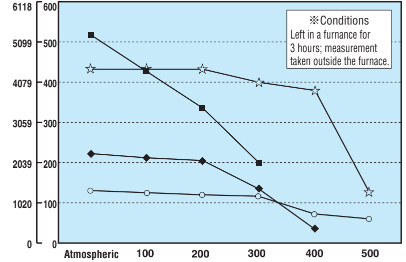
Mold Division, MISUMI.

〔PRODUCT DATA〕

PROPERTY CHART ON HEAT INSULATION SHEETS

■Charts of Properties

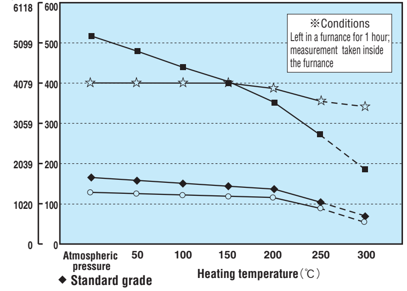
Compressive strength after thermal degradation



※Conditions
Left in a furnance for 3 hours; measurement taken outside the furnace.

◆ Standard grade
■ High strength grade
☆ High temperature proof grade（HIPL□ type）
○ Heat proof grade

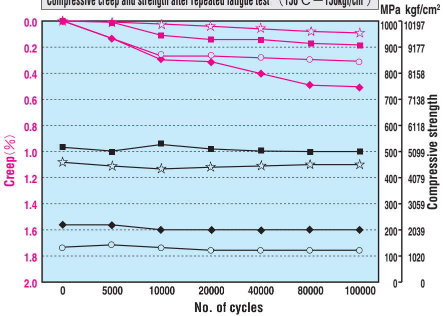
Temperature characteristics of compressive strength



※Conditions
Left in a furnance for 1 hour; measurement taken inside the furnance

◆ Standard grade
■ High strength grade
☆ High temperature proof grade（HIPL□ type）
○ Heat proof grade

Compressive creep and strength after repeated fatigue test（150℃ —150kgf/cm²）

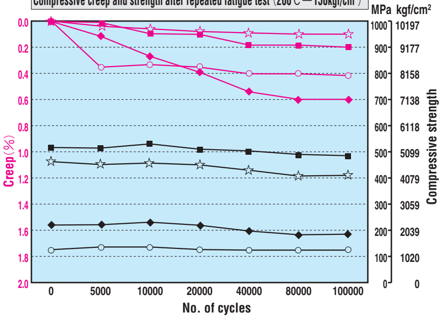


◆ Standard grade
■ High strength grade
☆ High temperature proof grade（HIPL□ type）
○ Heat proof grade

Testing Method	
Furnance temp.	150℃
Load	150kgf/cm²
Specimen	10t−200□

※Conditions: After repeatedly applying compressive load（20 sec./cycle —3 sec. ON, 17 sec. OFF）under specific temperature and pressure, measurement was performed under room temperature for its compressive creep（thickness change）and strength.

Compressive creep and strength after repeated fatigue test（200℃ —150kgf/cm²）

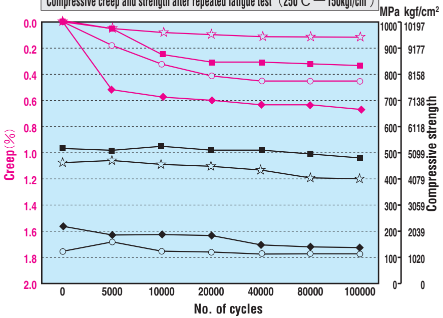


◆ Standard grade
■ High strength grade
☆ High temperature proof grade（HIPL□ type）
○ Heat proof grade

Testing Method	
Furnance temp.	200℃
Load	150kgf/cm²
Specimen	10t−200□

※Conditions: After repeatedly applying compressive load（20 sec./cycle —3 sec. ON, 17 sec. OFF）under specific temperature and pressure, measurement was performed under room temperature for its compressive creep（thickness chang）and strength.

Compressive creep and strength after repeated fatigue test（250℃ —150kgf/cm²）

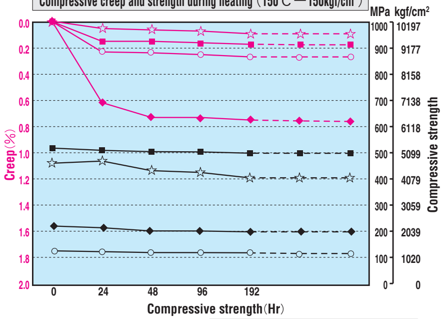


◆ Standard grade
■ High strength grade
☆ High temperature proof grade（HIPL□ type）
○ Heat proof grade

Testing Method	
Furnance temp.	250℃
Load	150kgf/cm²
Specimen	10t−200□

※Conditions: After repeatedly applying compressive load（20 sec./cycle —3 sec. ON, 17 sec. OFF）under specific temperature and pressure, measurement was performed under room temperature for its compressive creep（thickness change）and strength.

Compressive creep and strength during heating（150℃ —150kgf/cm²）



◆ Standard grade
■ High strength grade
☆ High temperature proof grade（HIPL□ type）
○ Heat proof grade

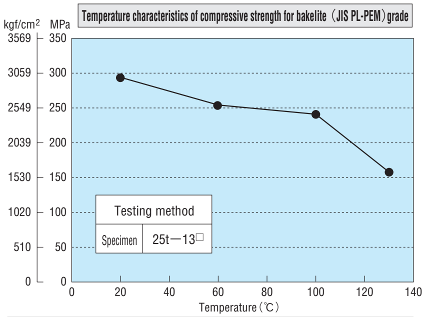
Testing Method	
Furnance temp.	150℃
Load	150kgf/cm²
Specimen	10t−25□

※Conditions: After leaving the specimen in a furnace for a specific time, measurement was performed under room temperature for its compressive creep（hickness change）and strength.

❢ Compressive creep···Dimensional change, expressed as the rate of change, that occurs along the elapsed time in a specimen under a specific pressure（compressive force）applied in its thickness direction.

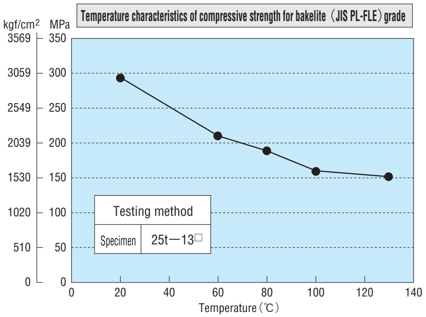
■Charts of Properties

Temperature characteristics of compressive strength for bakelite（JIS PL-PEM）grade



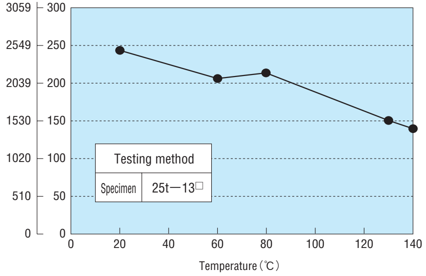
※Condition: Left in a furnace for 15 minutes; measurement taken inside the furnace.

Temperature characteristics of compressive strength for bakelite（JIS PL-FLE）grade



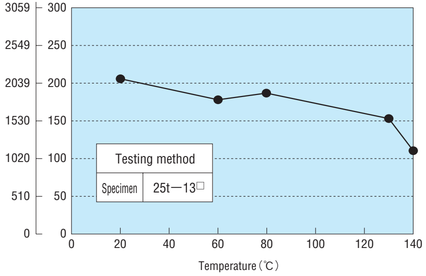
※Condition: Left in a furnace for 15 minutes; measurement taken inside the furnace.

Temperature characteristics of compressive strength after thermal degradation for bakelite（JIS PL-PEM）grade



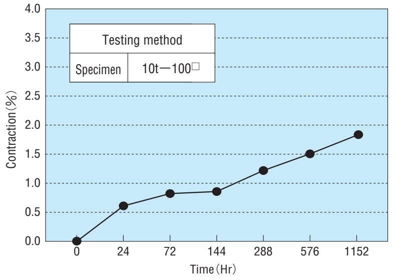
※Condition: After degradation under 130℃ for 1,150 hours, left in a furnace for 15 minutes and measured inside the furnace.

Temperature characteristics of compressive strength after thermal degradation for bakelit（JIS PL-FLE）grade



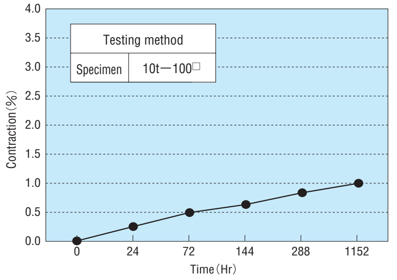
※Condition: After degradation under 130℃ for 1,150 hours, left in a furnace for 15 minutes and measured inside the furnace.

Thermal contraction for bakelite（JIS PL-PEM）grade



※Condition: The specimen was left in a 130℃ furnace, and a sample piece was taken at specific intervals to measure its thickness under room temperature.

Thermal contraction for bakelite（JIS PL-FLE）grade



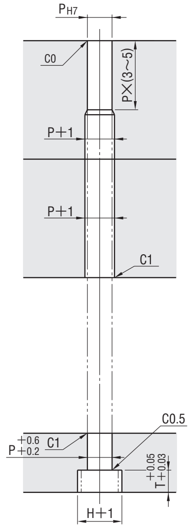
※Condition: The specimen was left in a 130℃ furnace, and a sample piece was taken at specific intervals to measure its thickness under room temperature.

STANDARD HOLE PROCESSING EXAMPLES①

Unless indicated otherwise, the end face of the hole plates is C0.5. The applications illustrated here are just processing examples. In actual application, it is necessary to consider a wide array of conditions and requirements, including pitch precision between holes, perpendicularity of the holes, surface roughness, roundness, plate material, parallelism, whether or not quenching is required, molding machine precision, product production volume, and tool wear. For this reason, please understand that MISUMI cannot accept any responsibility for problems that may arise from use of these examples.

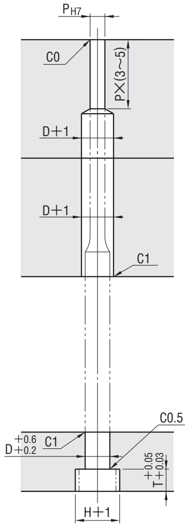
Ejector Pin

Straight Ejector Pin



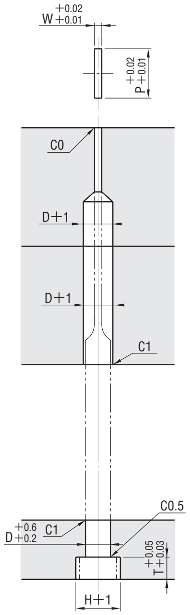
PH7
C0
P×(3~5)
P+1
P+1
C1
C0.5
P +0.6 +0.2
C1
T +0.05 +0.03
H+1

Stepped Ejector Pin



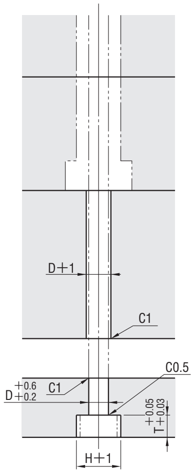
PH7
C0
P×(3~5)
D+1
D+1
C1
C0.5
D +0.6 +0.2
C1
T +0.05 +0.03
H+1

Rectangular Ejector Pin (P・W$^{\ 0}_{-0.01}$ Tolerance)



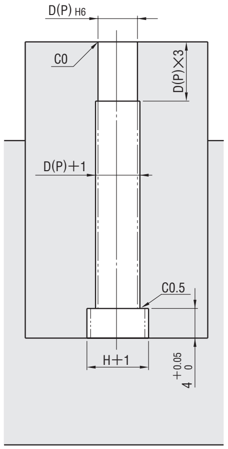
W +0.02 +0.01
P +0.02 +0.01
C0
D+1
D+1
C1
C0.5
D +0.6 +0.2
C1
T +0.05 +0.03
H+1

Center Pin



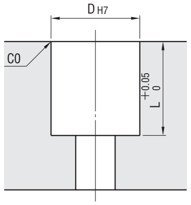
D+1
C1
C0.5
D +0.6 +0.2
C1
T +0.05 +0.03
H+1

Core Pin



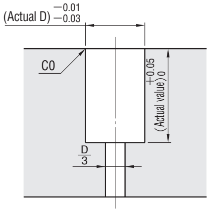
D(P) H6
C0
D(P)×3
D(P)+1
C0.5
H+1
4 +0.05 0

Date Marker Set



D H7
C0
L +0.05 0

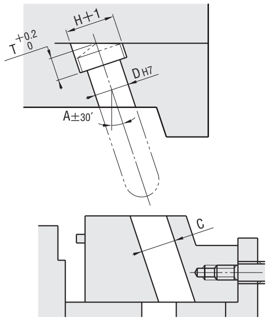
Gas Vents



(Actual D) −0.01 −0.03
C0
(Actual value) +0.05 0
D/3

Angular Pin

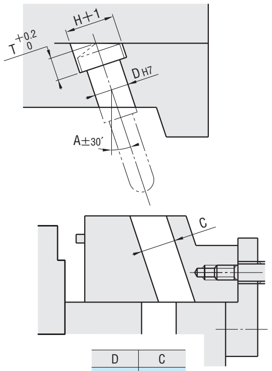
Angular Pin (AP・APZ)



H+1
T +0.2 0
D H7
A±30′
C

D	C
4~10	D+0.5
12~20	D+1
25~32	D+2
35~50	D+3

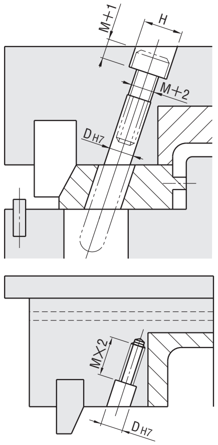
Angular Pin (APS・APZS)



H+1
T +0.2 0
D H7
A±30′
C

D	C
4~20	D
25~32	D+1
35~50	D+2

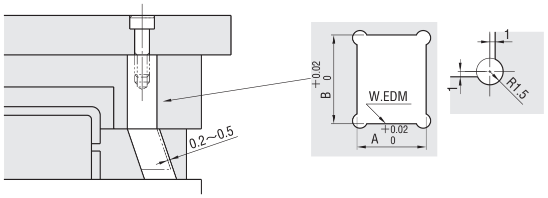
Angular Pin (with tap)



M+1
H
M+2
D H7
M×2
D H7

M	H
6	11
8	14
10	17.5
12	20
16	26
20	32

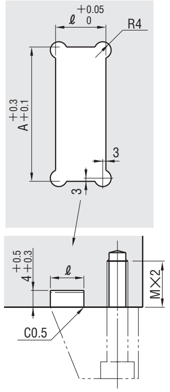
Angular Cam



B +0.02 0
W.EDM
A +0.02 0
0.2~0.5
1
1
R1.5

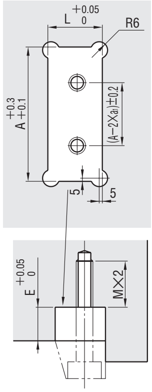
Locking Block

Positioning type



ℓ +0.05 0
R4
A +0.3 +0.1
3
3
4 +0.5 +0.3
ℓ
M×2
C0.5

Inlay type



L +0.05 0
R6
A +0.3 +0.1
(A−2×a1)±0.2
5
5
E +0.05 0
M×2

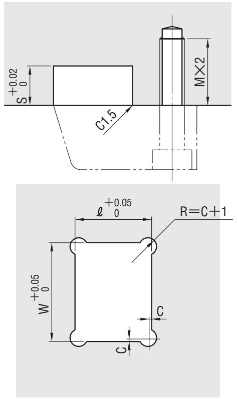
Product Data/ Technical Data

STANDARD HOLE PROCESSING EXAMPLES②

Unless indicated otherwise, the end face of the hole plates is C0.5. The applications illustrated here are just processing examples. In actual application, it is necessary to consider a wide array of conditions and requirements, including pitch precision between holes, perpendicularity of the holes, surface roughness, roundness, plate material, parallelism, whether or not quenching is required, molding machine precision, product production volume, and tool wear. For this reason, please understand that MISUMI cannot accept any responsibility for problems that may arise from use of these examples.

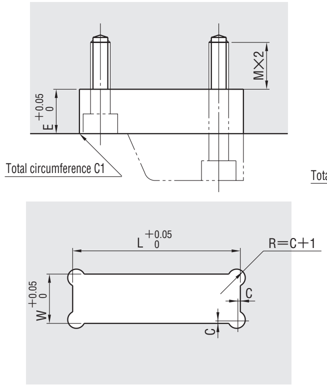
Locking Block with Angular Hole Process

ABPX



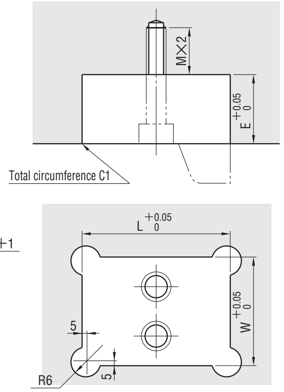
S +0.02 0
M×2
C1.5
ℓ +0.05 0
R=C+1
W +0.05 0
C
C

ABPZA



E +0.05 0
M×2
Total circumference C1
L +0.05 0
R=C+1
W +0.05 0
C
C

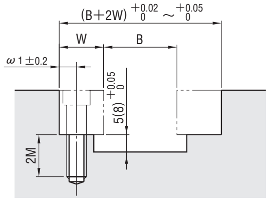
ABPZB



M×2
E +0.05 0
Total circumference C1
L +0.05 0
W +0.05 0
5
5
R6

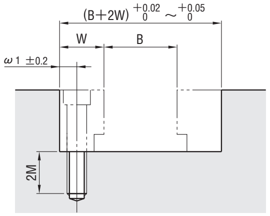
Guide Rail

No Guide Heel Type



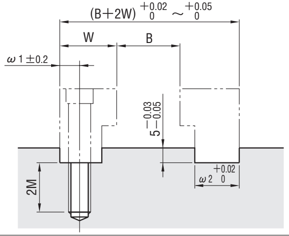
(B+2W) +0.02 0 ～ +0.05 0
W
B
ω1±0.2
+0.05 0
5(8)
2M

5·8 mm Guide Groove Type



(B+2W) +0.02 0 ～ +0.05 0
W
B
ω1 ±0.2
2M

15 mm Guide Groove Type

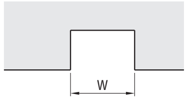


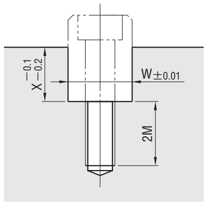
(B+2W) +0.02 0 ～ +0.05 0
W
B
ω1±0.2
5 −0.03 −0.05
ω2 +0.02 0
2M

B=(Slide core dimension A) +(heat expansion amount) +(gap)

Center Rail

・Slide core for center rail

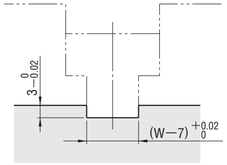




X −0.1 −0.2
W±0.01
2M

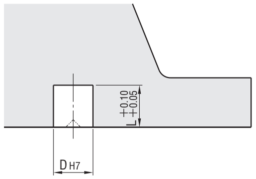
X is an elective dimension

Center Type Guide Rail

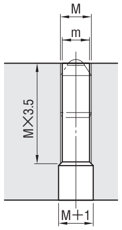


3 0 −0.02
(W−7) +0.02 0

Ball Plunger and Ball Button

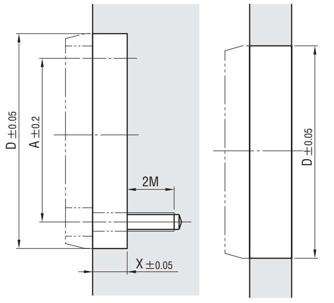


L +0.10 +0.05
D H7



Locating Ring

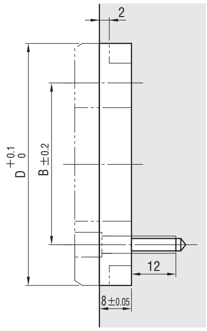
Locating Ring



D ±0.05
A ±0.2
2M
X±0.05
D ±0.05

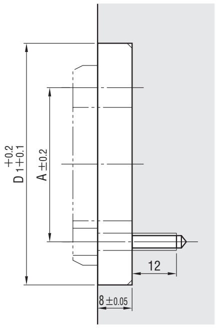
X is an elective dimension

Reversible Locating Ring



2
D +0.1 0
B ±0.2
12
8±0.05

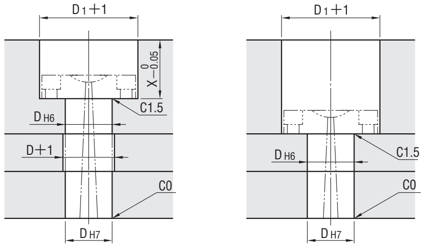
Large Diameter Locating Ring



D +0.2 +0.1
A ±0.2
12
8±0.05

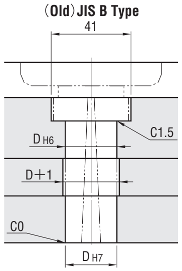
Sprue Bushing

(Old)JIS A Type



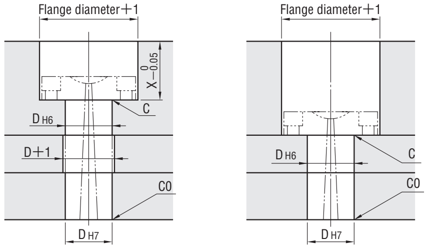
D1+1
X 0 −0.05
D H6
C1.5
D+1
C0
D H7
D1+1
D H6
C1.5
C0
D H7

(Old)JIS B Type



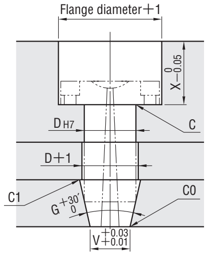
41
D H6
C1.5
D+1
C0
D H7

Bolt Type



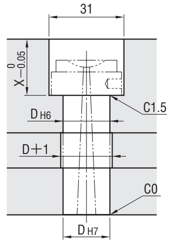
Flange diameter+1
X 0 −0.05
D H6
C
D+1
C0
D H7
Flange diameter+1
D H6
C
C0
D H7

Bolt Type with Taper



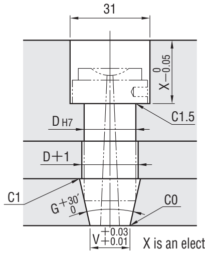
Flange diameter+1
X 0 −0.05
D H7
C
D+1
C1
G +30′ 0
C0
V +0.03 +0.01

Shoulder Type



31
X 0 −0.05
D H6
C1.5
D+1
C0
D H7

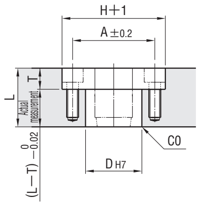
Shoulder Type with Taper



31
X 0 −0.05
D H7
C1.5
D+1
C1
G +30′ 0
C0
V +0.03 +0.01

X is an elective dimension

Sprue Bushing Guide

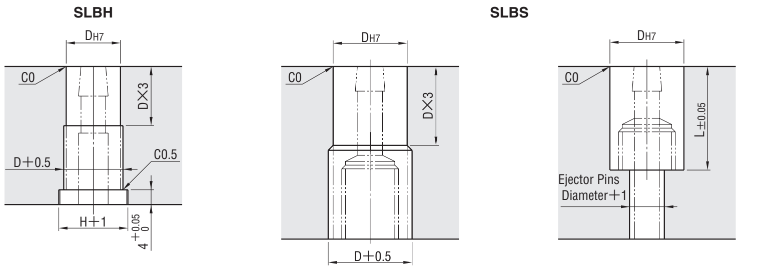


H+1
A±0.2
T
L
Actual measurement
C0
D H7
(L−T) 0 −0.02

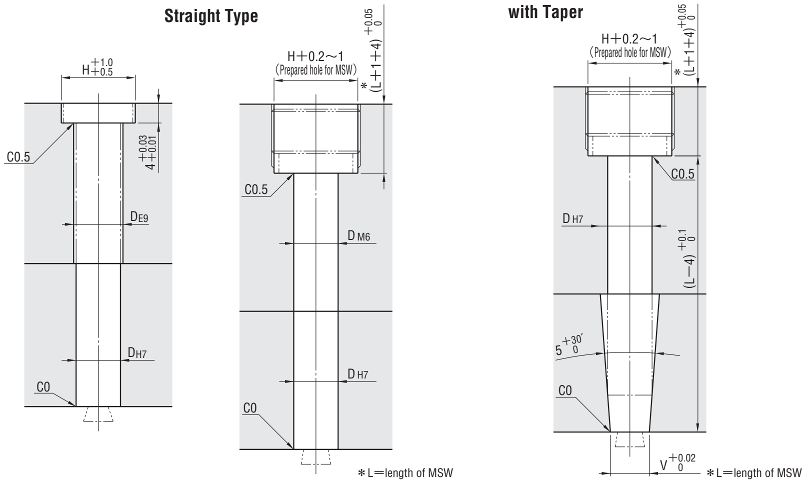
STANDARD HOLE PROCESSING EXAMPLES③

Unless indicated otherwise, the end face of the hole plates is C0.5. The applications illustrated here are just processing examples. In actual application, it is necessary to consider a wide array of conditions and requirements, including pitch precision between holes, perpendicularity of the holes, surface roughness, roundness, plate material, parallelism, whether or not quenching is required, molding machine precision, product production volume, and tool wear. For this reason, please understand that MISUMI cannot accept any responsibility for problems that may arise from use of these examples.

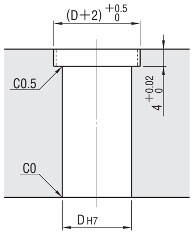
Sprue Lock Bushing


SLBH
SLBS
DH7
C0
D×3
D+0.5
C0.5
H+1
4 +0.05 0
Ejector Pins Diameter+1
L±0.05

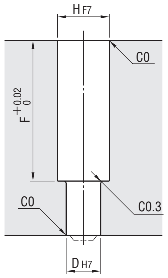
Runner Lock Pin


Straight Type
with Taper
H +1.0 +0.5
C0.5
4 +0.03 +0.01
DE9
DH7
C0
H+0.2∼1
(Prepared hole for MSW)
(L+1+4) +0.05 0
*
DM6
C0.5
DH7
C0
*L=length of MSW
(L−4) +0.1 0
5 +30' 0
V +0.02 0

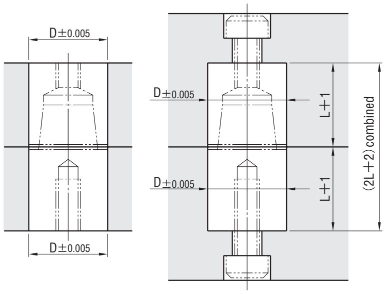
Runner Lock Pin Bushing


(D+2) +0.5 0
C0.5
4 +0.02 0
C0
DH7

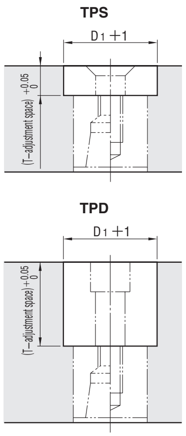
Pin-point Gate Bushing


HF7
C0
F +0.02 0
C0
C0.3
DH7

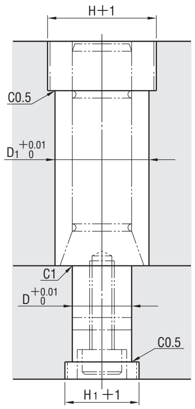
Tapered Pin Set


D±0.005
D±0.005
D±0.005
D±0.005
L+1
L+1
(2L+2) combined

Tapered Pin Set Spacer

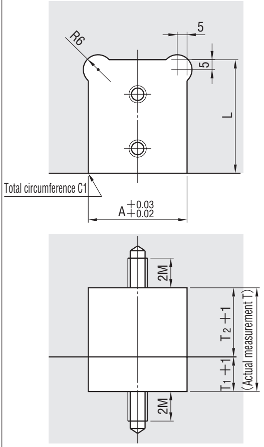

TPS
D1 +1
(T−adjustment space) +0.05 0
TPD
D1 +1
(T−adjustment space) +0.05 0

Tapered Guide Set

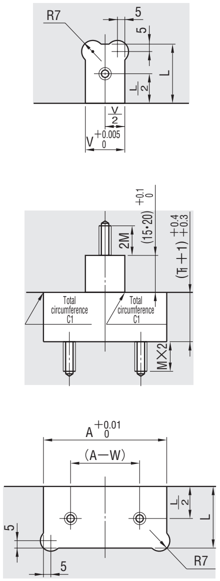

H+1
C0.5
D1 +0.01 0
C1
D +0.01 0
C0.5
H1 +1

※ P. 1223 for detailed directions.

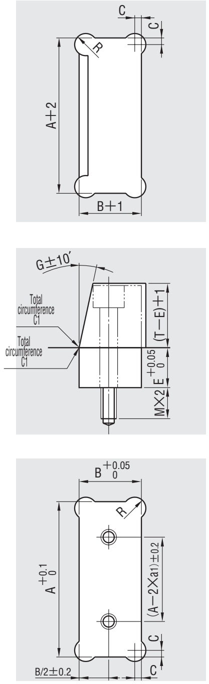
Tapered Block Set


R6
5
5
L
Total circumference C1
A +0.03 +0.02
2M
T2 +1
T1 +1
(Actual measurement T)
2M

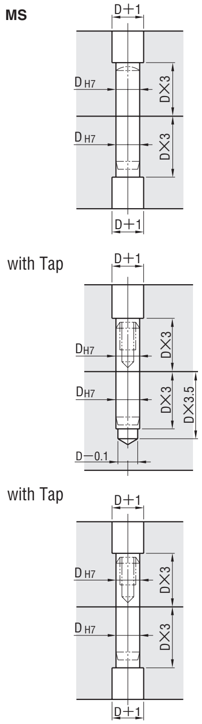
Locating Block Set


R7
5
5
L
L/2
V/2
V +0.005 0
2M
(15∼20) +0.1 0
(T1+1) +0.4 +0.3
Total circumference C1
Total circumference C1
M×2
A +0.01 0
(A−W)
L/2
L
5
5
R7

Side Cotter Block


C
C
R
A+2
B+1
G±10'
Total circumference C1
Total circumference C1
(T−E)+1
E +0.05 0
M×2
B +0.05 0
R
A +0.1 0
(A−2×a1)±0.2
C
B/2±0.2
C

Straight Dowel Pin


MS
D+1
DH7
D×3
DH7
D×3
D+1
with Tap
D+1
DH7
D×3
DH7
D×3
D×3.5
D−0.1
with Tap
D+1
DH7
D×3
DH7
D×3
D+1

STANDARD HOLE PROCESSING EXAMPLES④

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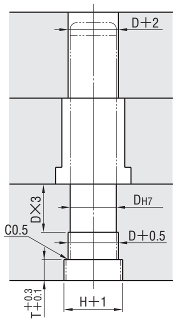
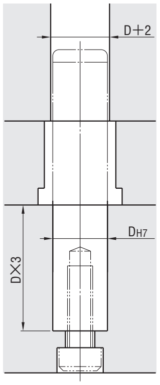
Precision Leader Pin

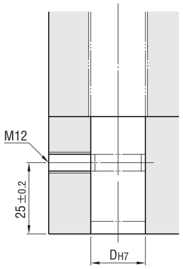
Head Type (GPHL)


D+2
D×3
DH7
C0.5
D+0.5
T+0.3 +0.1
H+1

Straight Type (GPSL)

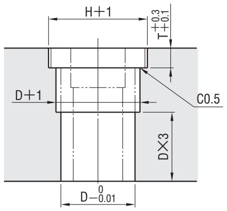


Straight Type
Stopper Groove Processed (YC)

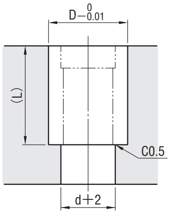

M12
25±0.2
DH7

Precision Leader Bushing

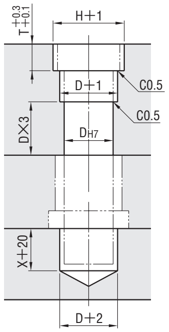
Head Type (GBH)

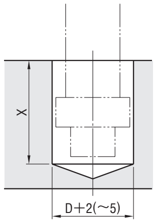

H+1
T+0.3 +0.1
D+1
C0.5
D×3
D 0 −0.01

Straight Type (GBS)


D 0 −0.01
(L)
C0.5
d+2

Support Pin・Support Pin Collar

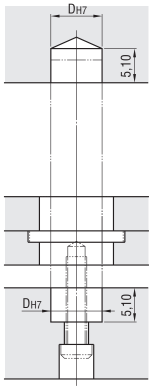

T+0.3 +0.1
H+1
D+1
C0.5
C0.5
D×3
DH7
X+20
D+2



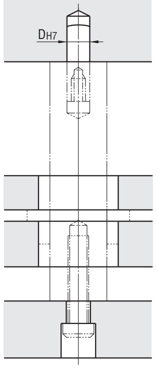
X is an elective dimension

Precision Ejector Leader Pin

EGH

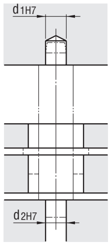

DH7
5,10
DH7
5,10

EGHC



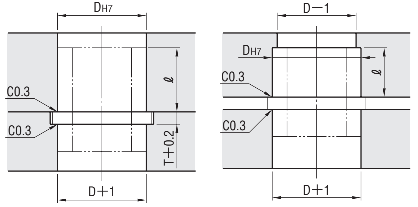
Ejector Leader Pin

EGPD・EGPDX

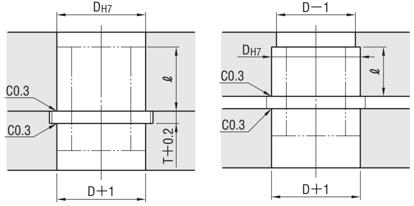


Ejector Leader Bushing

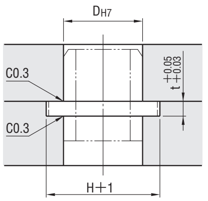
Plain Type (EGBH)


DH7
C0.3
C0.3
ℓ
T+0.2
D+1
D−1
DH7
C0.3
C0.3
ℓ
D+1

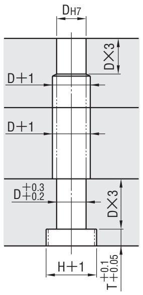
Linear Type (EGBL)


DH7
C0.3
C0.3
ℓ
T+0.2
D+1
D−1
DH7
C0.3
C0.3
ℓ
D+1

EGBZ

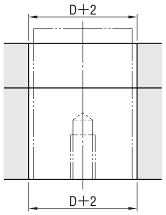

DH7
C0.3
C0.3
t+0.05 +0.03
H+1

Return Pin


DH7
D×3
D+1
D+1
D+0.3 +0.2
D×3
H+1
T+0.1 +0.05

Support Pillar

(SPL)



Stop Pin

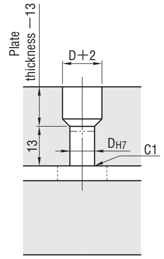
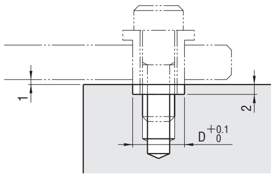


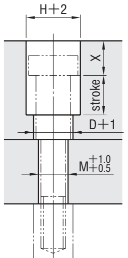
Plate thickness −13
D+2
13
DH7
C1

Tension Link Retainer

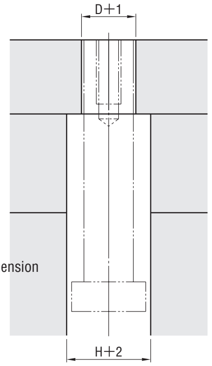


Stopper Bolt・Puller Bolt

Stopper Bolt

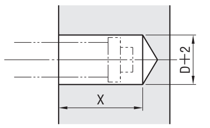

H+2
X
stroke
D+1
M+1.0 +0.5

Puller Bolt (PBTN)



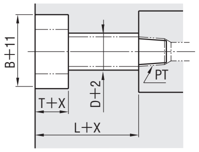
X is an elective dimension

Puller Bolt Collar



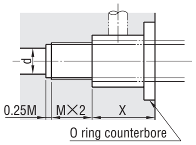
Joint Plug

(JTW・JTWS)

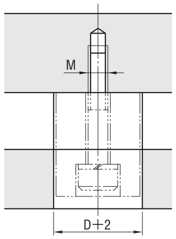

B+11
PT
T+X
D+2
L+X

Cooling Pipe

(WCP・WCSP)


d
0.25M
M×2
X
O ring counterbore

Ejector Rod



X is an elective dimension

SI (SYSTÈME INTERNATIONAL D'UNITÉS)

EXCERPT FROM JIS Z 8203 (1985)

1. International units SI and the method of use

1—1. Sphere of application This standard specifies how to use the International System of Units（SI）and other international unitary systems, as well as units used in correlation with units from international systems, and other units which may be used.

1—2. Terminology and definitions Terminology used in this specification and definitions thereof are as follows:

（1）**International System of Units（SI）**	Coherent system of units adopted and recommended by the International Committee on Weights and Measures. It contains base units and supplementary units,units derived from them, and their integral exponents to the 10th power.
（2）**SI unit**	SI is the abbreviation of Systeme International d'Unites（International System of Units）.
（3）**Base unit**	Those units given in **Table 1.**
（4）**Supplementary unit**	Those units given in **Table 2.**

Table 1. Base unit

Volume	Unit	Sign	Definition
Length	Meter	m	The meter is the distance light travels in 1/299,792,458 of a second in a vacuum.
Mass	Kilogram	kg	The kilogram is a unit of mass（not weight nor force）, equal to the mass of an international prototype stored in Sevres, France.
Time	Second	s	The second is a fundamental unit of time, equal to 9, 192, 631, 770 periods of radiation corresponding to the transition between two superfine levels of the ground state of an atom of cesium-133.
Electric current	Ampere	A	The ampere is a unit of electric current, defined as a 2×10^{-7}newton force of attraction exerted at 1 meter intervals between two parallel current-carrying linear conductors that are infinitely small in circular cross-sectional area and infinitely long in length.
Thermodynamic temperature	Kelvin	K	The kelvin is a unit of absolute temperature equal to 1/273.16 of the absolute temperature of the triple point of water.
Amount of substance	Mole	mol	The mole is the amount of substance of a system（with a specific composition）which contains as many elementary units⑴as there are atoms of carbon in 0.012 kilogram of pure nuclide carbon12. The mole is used to specify both the elementary unit and system.
Luminous intensity	Candela	cd	The candela is a unit of luminous intensity, defined as the luminous intensity of a steradian light source which emits a monochrome radiation at a frequency of 540×10^{12}Hz, in a specified direction and at a force equal to 1/683 watts.

Note（1）: The elementary unit must be specified and must be an atom, molecule, ion, electron, photon or a specified group of such units.

Table 2. Supplementary unit

Volume	Unit	Sign	Definition
Plane angle	Radian	rad	The radian is a unit of plane angle, defined as the central angle of a circle determined by two radii and an arc joining them, all of the same length.
Solid angle	Steradian	sr	The steradian is the unit of measurement for solid angles, equal to the solid angle subtended center of a sphere by a portion of the surface of the sphere whose area equals the square of the sphere's radius.

（5）**Derived units** The units of derived quantity in International units. Those are expressed algebraically in terms of the base units and supplementary units. Besides, the derived units that have proper names are shown in **Table 3.**

Examples of the units derived from the base units

Volume	Derived units	
	Unit	Sign
Area	Square	m^2
Volume	Cubic	m^3
Velocity	Meter/second	m/s
Acceleration	Meter/second^2	m/s^2
Wave numbers	Every meter	m^{-1}
Density	Kilogram every cubic meter	kg/m^3
Electric current density	Ampere every square meter	A/m^2
Magnetic field strength	Ampere every meter	A/m
Concentration of substance	Mole every cubic meter	mol/m^3
Specific volume	Cubic meter every kilogram	m^3/kg
Luminance	Candela every square meter	cd/m^2

Table 3. The derived units having proper names

Volume	Derived units		Expressing method by derived unit or supplementary unit/others
	Unit	Sign	
Frequency	Hertz	Hz	$1Hz=1s^{-1}$
Force	Newton	N	$1N=1kg\cdot m/s^2$
Pressure, stress	Pascal	Pa	$1Pa=1N/m^2$
Energy, work, heat	Joule	J	$1J=1N\cdot m$
Work rate, process rate, power, electric power	Watt	W	$1W=1J/s$
Electric charge, quantity of electricity	Coulomb	C	$1C=1A\cdot s$
Potential, potential difference, voltage, electromotive force	Voltage	V	$1V=1J/C$
Electrostatic capacity, capacitance	Farad	F	$1F=1C/V$
Electric resistance	Ohm	Ω	$1\Omega=1V/A$
Conductance	Siemens	S	$1S=1\Omega^{-1}$
Magnetic flux	Weber	Wb	$1Wb=1V\cdot s$
Magnetic flux density, magnetic induction	Tesla	T	$1T=1Wb/m^2$
Inductance	Henry	H	$1H=1Wb/A$
Celsius temperature	Celsius degree or Degree	℃	1t℃＝（t＋273.15）k
Light flux	Lumen	Im	$1lm=1cd\cdot sr$
Illumination	Lux	Ix	$1lx=1lm/m^2$
Radioactivity	Becquerel	Bq	$1Bq=1s^{-1}$
Quantity of absorption radio	Gray	Gy	$1Gy=1J/kg$
Radio equivalent	Sievert	Sv	$1Sv=1J/kg$

1—3. Integral multiplication in SI units

Prefixes The multiple for composing the integral multiplication of 10 in SI units, names of prefixed and their symbols are shown in **Table 4.**

Table 4. Prefixes

Multiple to be combined with unit	Prefixes		Multiple to be combined with unit	Prefixes		Multiple to be combined with unit	Prefixes	
	Name	Sign		Name	Sign		Name	Sign
10^{18}	Exsa	E	10^{2}	Hect	h	10^{-9}	Nano	n
10^{15}	Peta	P	10	Deca	da	10^{-12}	Pico	p
10^{12}	Tera	T	10^{-1}	Deci	d	10^{-15}	Femt	f
10^{9}	Giga	G	10^{-2}	Centi	c	10^{-18}	Ato	a
10^{6}	Mega	M	10^{-3}	Milli	m			
10^{3}	Kilo	k	10^{-6}	Micro	μ			

2. Table of conversion rate of JIS units attendant upon switchover to SI units

The units contained in bold lines are SI units.

	N	dyn	kgf
Force	1	1×10^{5}	$1.019\ 72\times10^{-1}$
	1×10^{-5}	1	$1.019\ 72\times10^{-6}$
	$9.806\ 65$	$9.806\ 65\times10^{5}$	1

	Pa・s	cP	P
Viscosity	1	1×10^{3}	1×10
	1×10^{-3}	1	1×10^{-2}
	1×10^{-1}	1×10^{2}	1

Note）$1P=1dyn\cdot s/cm^2=1g/cm\cdot s$

$1Pa\cdot s=1N\cdot S/m^2$, $1cP=1mPa\cdot s$

	Pa or N/m²	**MPa or N/mm²**	kgf/mm²	kgf/cm²
Stress	1	1×10^{-6}	$1.019\ 72\times10^{-7}$	$1.019\ 72\times10^{-5}$
	1×10^{6}	1	$1.019\ 72\times10^{-1}$	$1.019\ 72\times10$
	$9.806\ 65\times10^{6}$	$9.806\ 65$	1	1×10^{2}
	$9.806\ 65\times10^{4}$	$9.806\ 65\times10^{-2}$	1×10^{-2}	1

Note）$1Pa=1N/m^2$, $1Mpa=1N/mm^2$

	m²/s	cSt	St
Kinematic viscosity	1	1×10^{6}	1×10^{4}
	1×10^{-6}	1	1×10^{-2}
	1×10^{-4}	1×10^{2}	1

Note）$1St=1cm^2/s$, $1cSt=1mm/S^2$

	Pa	**kPa**	**MPa**	bar	kgf/cm²	atm	mmH₂0	mmHg or Torr
Pressure	1	1×10^{-3}	1×10^{-6}	1×10^{-5}	$1.019\ 72\times10^{-5}$	$9.869\ 23\times10^{-6}$	$1.019\ 72\times10^{-1}$	$7.500\ 62\times10^{-3}$
	1×10^{3}	1	1×10^{-3}	1×10^{-2}	$1.019\ 72\times10^{-2}$	$9.869\ 23\times10^{-3}$	$1.019\ 72\times10^{2}$	$7.500\ 62$
	1×10^{6}	1×10^{3}	1	1×10	$1.019\ 72\times10$	$9.869\ 23$	$1.019\ 72\times10^{5}$	$7.500\ 62\times10^{3}$
	1×10^{5}	1×10^{2}	1×10^{-1}	1	$1.019\ 72$	$9.869\ 23\times10^{-1}$	$1.019\ 72\times10^{4}$	$7.500\ 62\times10^{2}$
	$9.806\ 65\times10^{4}$	$9.806\ 65\times10$	$9.806\ 65\times10^{-2}$	$9.806\ 65\times10^{-1}$	1	$9.678\ 41\times10^{-1}$	1×10^{4}	$7.355\ 59\times10^{2}$
	$1.013\ 25\times10^{5}$	$1.013\ 25\times10^{2}$	$1.013\ 25\times10^{-1}$	$1.013\ 25$	$1.033\ 23$	1	$1.033\ 23\times10^{4}$	$7.600\ 00\times10^{2}$
	$9.806\ 65$	$9.806\ 65\times10^{-3}$	$9.806\ 65\times10^{-6}$	$9.806\ 65\times10^{-5}$	1×10^{-4}	$9.678\ 41\times10^{-5}$	1	$7.355\ 59\times10^{-2}$
	$1.333\ 22\times10^{2}$	$1.333\ 22\times10^{-1}$	$1.333\ 22\times10^{-4}$	$1.333\ 22\times10^{-3}$	$1.359\ 51\times10^{-3}$	$1.315\ 79\times10^{-3}$	$1.359\ 51\times10$	1

Note）$1Pa=1N/m^2$

	J	kW・h	kgf・m	kcal
Work, energy, quantity of heat	1	$2.777\ 78\times10^{-7}$	$1.019\ 72\times10^{-1}$	$2.388\ 89\times10^{-4}$
	$3.600\ \ \times10^{6}$	1	$3.670\ 98\times10^{5}$	$8.600\ \ 0\times10^{2}$
	$9.806\ 65$	$2.724\ 07\times10^{-6}$	1	$2.342\ 70\times10^{-3}$
	$4.186\ 05\times10^{3}$	$1.162\ 79\times10^{-3}$	$4.268\ 58\times10^{2}$	1

Note）$1J=1W\cdot s$, $1J=1N\cdot m$

	W	kgf・m/s	PS	kcal/h
Power, heat flow rate	1	$1.019\ 72\times10^{-1}$	$1.359\ 62\times10^{-3}$	$8.600\ 0\times10^{-1}$
	$9.806\ 65$	1	$1.333\ 33\times10^{-2}$	$8.433\ 71$
	7.355×10^{2}	7.5×10	1	$6.325\ 29\times10^{2}$
	$1.162\ 79$	$1.185\ 72\times10^{-1}$	$1.580\ 95\times10^{-3}$	1

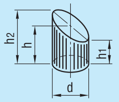
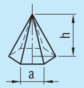
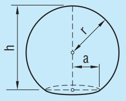
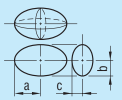
Note）$1W=1J/s$, PS：French horsepower

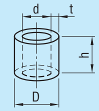
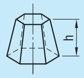
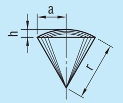
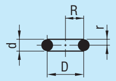
	W/(m・K)	kcal/（m・h・℃）
Thermal conductivity	1	$8.600\ 0\times10^{-1}$
	$1.162\ 79$	1

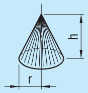
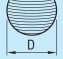
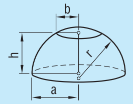
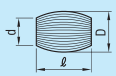
	W/(m²・K)	kcal/(m²・h・℃)
Coefficient of heat transfer	1	$8.600\ 0\times10^{-1}$
	$1.162\ 79$	1

	J/(kg・K)	kcal/(kg・℃) cal/(g・℃)
Specified heat	1	$2.388\ 89\times10^{-4}$
	$4.186\ 05\times10^{-3}$	1

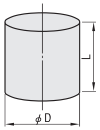
〔TECHNICAL DATA〕
CALCULATION OF CUBIC VOLUME AND PHYSICAL CHARACTERISTICS OF METALS

Solid	Volume V
Truncated cylinder 	$V=\frac{\pi}{4}d^2h$ $=\frac{\pi}{4}d^2\left(\frac{h_1+h_2}{2}\right)$
Pyramid 	$V=\frac{h}{3}A=\frac{h}{6}arn$ A=Area of base r=Radius of inscribed circle a=Length of a side of a regular polygon n=Number of the sides of a regular polygon
Spherical crown 	$V=\frac{\pi h^2}{3}(3r-h)$ $=\frac{\pi h}{6}(3a^2+h^2)$ a is the radius.
Ellipsoid 	$V=\frac{4}{3}\pi abc$ In case of a spheroid (b=c): $V=\frac{4}{3}\pi ab^2$

Solid	Volume V
Hollow cylinder 	$V=\frac{\pi}{4}h(D^2-d^2)$ $=\pi th(D-t)$ $=\pi th(d+t)$
Truncated pyramid 	$V=\frac{h}{3}(A+a+\sqrt{Aa})$ A,a=Area of both ends
Spherical segment 	$V=\frac{2}{3}\pi r^2h$ $=2.0944r^2h$
Torus 	$V=2\pi^2Rr^2$ $=19.739Rr^2$ $=\frac{\pi^2}{4}Dd^2$ $=2.4674Dd^2$

Solid	Volume V
Circular cone 	$V=\frac{\pi}{3}r^2h$ $=1.0472r^2h$
Sphere 	$V=\frac{4}{3}\pi r^3=4.1888r^3$ $=\frac{\pi}{6}d^3=0.5236d^3$
Spherical belt 	$V=\frac{\pi h}{6}(3a^2+3b^2+h^2)$
Barrel 	When circumferance makes a curve equal to the circular arc, $V=\frac{\pi \ell}{12}(2D^2+d^2)$ When its periphery makes a curve equal to a parabolic line, $V=0.209\ell(2D^2Dd+1/4d^2)$

■How to Calculate The Weight



Weight W[g] = Volume[cm³]×Specific gravity

Example: Soft steel

ϕD=16 L=50mm, then the weight is:

$W=\frac{\pi}{4}D^2\times L\times$Specific gravity

$=\frac{\pi}{4}\times1.6^2\times5\times7.85$

$\fallingdotseq79$[g]

■How to Calculate Dimensional Changes due to Thermal Expansion

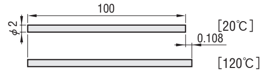
Example: SKD61

When the temperature of a pin whose ϕD=2 and L=100mm raises by 100℃, its dimensional change amount δ is:

δ=Thermal expansion coefficient×Overall length×Temperature change

$=10.8\times10^{-6}\times100\text{mm}\times100℃$

=0.108〔mm〕



■How to Calculate Distortion from Young's Modulus E

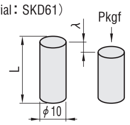
Example：The distortion λ obtained when a load of P=1000kgf is applied to a ϕ10×L60 pin (Material：SKD61)

$$E=\frac{PL}{A\lambda}$$

$$\lambda=\frac{PL}{AE}=\frac{1000\times60}{78.5\times21000}$$

$\fallingdotseq0.036$mm

Crossectional area $A=\frac{\pi}{4}D^2\fallingdotseq78.5$



■ Physical Characteristics of Metals

Materials	Specific gravity	Young's modulus	Thermal expansion coefficient	
		$\text{X}10^{-6}/℃$	GPa	{kgf/mm²}
Soft steel	7.85	11.7	214	21000
NAK80	7.8	12.5	209	20500
SKD61	7.75	10.8	214	21000
SKH51	8.2	10.1	227	22300
Carbide Alloy (JIS V40)	13.9	6.0	551	54000
Cast iron	7.3	9.2～11.8	76～107	7500～10500
SUS440C	7.78	10.2	208	20400
Oxygen free copper (C1020)	8.9	17.6	119	11700
6/4Brass (C2801)	8.4	20.8	105	10300
Beryllium steel C1720	8.3	17.1	133	13000
Aluminum A1100	2.7	23.6	70	6900
Duralumin A7075	2.8	23.6	73	7200
Titanium	4.5	8.4	108	10600

〔TECHNICAL DATA〕
GENERAL DIMENSIONAL TOLERANCE
EXCERPT FROM JIS B 0405(1991) • JIS B 0419(1991)

1. General dimensional tolerance of cutting JIS B 0405 —1991

Length dimensional tolerance (excluding chamfered parts)

Unit: mm

Degree		Standard dimension							
Symbol	Explanation	0.5 [1] to 3 incl.	Over 3 to 6 incl.	Over 6 to 30 incl.	Over 30 to 120 incl.	Over 120 to 400 incl.	Over 400 to 1000 incl.	Over 1000 to 2000 incl.	Over 2000 to 4000 incl.
		Tolerance							
f	Fine	±0.05	±0.05	±0.1	±0.15	±0.2	±0.3	±0.5	—
m	Medium	±0.1	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2
c	Coarse	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3	±4
v	Very coarse	—	±0.5	±1	±1.5	±2.5	±4	±6	±8

Note(1)：Tolerance for standard dimensions of less than 0.5mm shall be specified individually.

2. Length dimensional tolerance in chamfered parts
(corner roundness or chamfer dimension)

Unit: mm

Degree		Standard dimension		
Symbol	Explanation	0.5 [1] to 3 incl.	Over 3 to 6 incl.	Over 6
		Tolerance		
f	Fine	±0.2	±0.5	±1
m	Medium			
C	Coarse	±0.4	±1	±2
V	Very coarse			

Note(1)：Tolerance for standard dimensions of less than 0.5mm shall be specified individually.

3. Tolerance of angle dimension

Unit: mm

Degree		Shorter side of corner				
Symbol	Explanation	10 or less	Over 10 to 50 incl.	Over 50 to 120 incl.	Over 120 to 400 incl.	Over 400
		Tolerance				
f	Fine	±1°	±30′	±20′	±10′	± 5′
m	Medium					
c	Coarse	±1° 30′	± 1°	±30′	±15′	±10′
v	Very coarse	±3°	± 2°	± 1°	±30′	±20′

4. General tolerance of perpendicularity
JIS B 0419 —1991

Unit: mm

Degree	Nominal length on shorter side			
	100 or less	Over 100 to 300 incl.	Over 300 to 1000 incl.	Over 1000 to 3000 incl.
	Squareness tolerance			
H	0.2	0.3	0.4	0.5
K	0.4	0.6	0.8	1
L	0.6	1	1.5	2

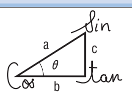
5. General tolerance of straightness and flatness
JIS B 0419 —1991

Unit: mm

Degree	Nominal area					
	10 or less	Over 10 to 30 incl.	Over 30 to 100 incl.	Over 100 to 300 incl.	Over 300 to 1000 incl.	Over 1000 to 3000 incl.
	Straightness and flatness tolerance					
H	0.02	0.05	0.1	0.2	0.3	0.4
K	0.05	0.1	0.2	0.4	0.6	0.8
L	0.1	0.2	0.4	0.8	1.2	1.6

〔TECHNICAL DATA〕

CONVERSION TABLE OF TRIGONOMETRIC FUNCTIONS



$a = \frac{b}{\cos\theta}$, $\frac{c}{\sin\theta}$

$b = a \cdot \cos\theta$, $\frac{c}{\tan\theta}$

$c = a \cdot \sin\theta$, $b \cdot \tan\theta$

θ	When deg =0° 00' ~11° 50'				
deg	sin θ	cos θ	tan θ	cot θ	
0° 00'	.0000	1.0000	.0000	∞	90° 00'
10	.0029	1.0000	.0029	343.77	50
20	.0058	1.0000	.0058	171.89	40
30	.0087	1.0000	.0087	114.59	30
40	.0116	0.9999	.0116	85.940	20
50	.0145	.9999	.0145	68.750	10
1° 00'	.0175	.9998	.0175	57.290	89° 00'
10	.0204	.9998	.0204	49.104	50
20	.0233	.9997	.0233	42.964	40
30	.0262	.9997	.0262	38.188	30
40	.0291	.9996	.0291	34.368	20
50	.0320	.9995	.0320	31.242	10
2° 00'	.0349	.9994	.0349	28.636	88° 00'
10	.0378	.9993	.0378	26.432	50
20	.0407	.9992	.0407	24.542	40
30	.0436	.9990	.0437	22.904	30
40	.0465	.9989	.0466	21.470	20
50	.0494	.9988	.0495	20.206	10
3° 00'	.0523	.9986	.0524	19.081	87° 00'
10	.0552	.9985	.0553	18.075	50
20	.0581	.9983	.0582	17.169	40
30	.0610	.9981	.0612	16.350	30
40	.0640	.9980	.0641	15.605	20
50	.0669	.9978	.0670	14.924	10
4° 00'	.0698	.9976	.0699	14.301	86° 00'
10	.0727	.9974	.0729	13.727	50
20	.0756	.9971	.0758	13.197	40
30	.0785	.9969	.0787	12.706	30
40	.0814	.9967	.0816	12.251	20
50	.0843	.9964	.0846	11.826	10
5° 00'	.0872	.9962	.0875	11.430	85° 00'
10	.0901	.9959	.0904	11.059	50
20	.0929	.9957	.0934	10.712	40
30	.0958	.9954	.0963	10.385	30
40	.0987	.9951	.0992	10.078	20
50	.1016	.9948	.1022	9.7882	10
6° 00'	.1045	.9945	.1051	9.5144	84° 00'
10	.1074	.9942	.1080	9.2553	50
20	.1103	.9939	.1110	9.0098	40
30	.1132	.9936	.1139	8.7769	30
40	.1161	.9932	.1169	8.5555	20
50	.1190	.9929	.1198	8.3450	10
7° 00'	.1219	.9925	.1228	8.1443	83° 00'
10	.1248	.9922	.1257	7.9530	50
20	.1276	.9918	.1287	7.7704	40
30	.1305	.9914	.1317	7.5958	30
40	.1334	.9911	.1346	7.4287	20
50	.1363	.9907	.1376	7.2687	10
8° 00'	.1392	.9903	.1405	7.1154	82° 00'
10	.1421	.9899	.1435	6.9682	50
20	.1449	.9894	.1465	6.8269	40
30	.1478	.9890	.1495	6.6912	30
40	.1507	.9886	.1524	6.5606	20
50	.1536	.9881	.1554	6.4348	10
9° 00'	.1564	.9877	.1584	6.3138	81° 00'
10	.1593	.9872	.1614	6.1970	50
20	.1622	.9868	.1644	6.0844	40
30	.1650	.9863	.1673	5.9758	30
40	.1679	.9858	.1703	5.8708	20
50	.1708	.9853	.1733	5.7694	10
10° 00'	.1736	.9848	.1763	5.6713	80° 00'
10	.1765	.9843	.1793	5.5764	50
20	.1794	.9838	.1823	5.4845	40
30	.1822	.9833	.1853	5.3955	30
40	.1851	.9827	.1883	5.3093	20
50	.1880	.9822	.1914	5.2257	10
11° 00'	.1908	.9816	.1944	5.1446	79° 00'
10	.1937	.9811	.1974	5.0658	50
20	.1965	.9805	.2004	4.9894	40
30	.1994	.9799	.2035	4.9152	30
40	.2022	.9793	.2065	4.8430	20
50	.2051	.9787	.2095	4.7729	78° 10
	cos θ	sin θ	cot θ	tan θ	deg
	When deg =78° 10'~90° 00'				θ

θ	When deg =12° 00'~23° 50'				
deg	sin θ	cos θ	tan θ	cot θ	
12° 00'	.2079	.9781	.2126	4.7046	78° 00'
10	.2108	.9775	.2156	4.6382	50
20	.2136	.9769	.2186	4.5736	40
30	.2164	.9763	.2217	4.5107	30
40	.2193	.9757	.2247	4.4494	20
50	.2221	.9750	.2278	4.3897	10
13° 00'	.2250	.9744	.2309	4.3315	77° 00'
10	.2278	.9737	.2339	4.2747	50
20	.2306	.9730	.2370	4.2193	40
30	.2334	.9724	.2401	4.1653	30
40	.2363	.9717	.2432	4.1126	20
50	.2391	.9710	.2462	4.0611	10
14° 00'	.2419	.9703	.2493	4.0108	76° 00'
10	.2447	.9696	.2524	3.9617	50
20	.2476	.9689	.2555	3.9136	40
30	.2504	.9681	.2586	3.8667	30
40	.2532	.9674	.2617	3.8208	20
50	.2560	.9667	.2648	3.7760	10
15° 00'	.2588	.9659	.2679	3.7321	75° 00'
10	.2616	.9652	.2711	3.6891	50
20	.2644	.9644	.2742	3.6470	40
30	.2672	.9636	.2773	3.6059	30
40	.2700	.9628	.2805	3.5656	20
50	.2728	.9621	.2836	3.5261	10
16° 00'	.2756	.9613	.2867	3.4874	74° 00'
10	.2784	.9605	.2899	3.4495	50
20	.2812	.9596	.2931	3.4124	40
30	.2840	.9588	.2962	3.3759	30
40	.2868	.9580	.2994	3.3402	20
50	.2896	.9572	.3026	3.3052	10
17° 00'	.2924	.9563	.3057	3.2709	73° 00'
10	.2952	.9555	.3089	3.2371	50
20	.2979	.9546	.3121	3.2041	40
30	.3007	.9537	.3153	3.1716	30
40	.3035	.9528	.3185	3.1397	20
50	.3062	.9520	.3217	3.1084	10
18° 00'	.3090	.9511	.3249	3.0777	72° 00'
10	.3118	.9502	.3281	3.0475	50
20	.3145	.9492	.3314	3.0178	40
30	.3173	.9483	.3346	2.9887	30
40	.3201	.9474	.3378	2.9600	20
50	.3228	.9465	.3411	2.9319	10
19° 00'	.3256	.9455	.3443	2.9042	71° 00'
10	.3283	.9446	.3476	2.8770	50
20	.3311	.9436	.3508	2.8502	40
30	.3338	.9426	.3541	2.8239	30
40	.3365	.9417	.3574	2.7980	20
50	.3393	.9407	.3607	2.7725	10
20° 00'	.3420	.9397	.3640	2.7475	70° 00'
10	.3448	.9387	.3673	2.7228	50
20	.3475	.9377	.3706	2.6985	40
30	.3502	.9367	.3739	2.6746	30
40	.3529	.9356	.3772	2.6511	20
50	.3557	.9346	.3805	2.6279	10
21° 00'	.3584	.9336	.3839	2.6051	69° 00'
10	.3611	.9325	.3872	2.5826	50
20	.3638	.9315	.3906	2.5605	40
30	.3665	.9304	.3939	2.5386	30
40	.3692	.9293	.3973	2.5172	20
50	.3719	.9283	.4006	2.4960	10
22° 00'	.3746	.9272	.4040	2.4751	68° 00'
10	.3773	.9261	.4074	2.4545	50
20	.3800	.9250	.4108	2.4342	40
30	.3827	.9239	.4142	2.4142	30
40	.3854	.9228	.4176	2.3945	20
50	.3881	.9216	.4210	2.3750	10
23° 00'	.3907	.9205	.4245	2.3559	67° 00'
10	.3934	.9194	.4279	2.3369	50
20	.3961	.9182	.4314	2.3183	40
30	.3987	.9171	.4348	2.2998	30
40	.4014	.9159	.4383	2.2817	20
50	.4041	.9147	.4417	2.2637	66° 10
	cos θ	sin θ	cot θ	tan θ	deg
	When deg =66° 10' ~78° 00'				θ

θ	When deg =24° 00'~35° 50'				
deg	sin θ	cos θ	tan θ	cot θ	
24° 00'	.4067	.9135	.4452	2.2460	66° 00'
10	.4094	.9124	.4487	2.2286	50
20	.4120	.9112	.4522	2.2113	40
30	.4147	.9100	.4557	2.1943	30
40	.4173	.9088	.4592	2.1775	20
50	.4200	.9075	.4628	2.1609	10
25° 00'	.4226	.9063	.4663	2.1445	65° 00'
10	.4253	.9051	.4699	2.1283	50
20	.4279	.9038	.4734	2.1123	40
30	.4305	.9026	.4770	2.0965	30
40	.4331	.9013	.4806	2.0809	20
50	.4358	.9001	.4841	2.0655	10
26° 00'	.4384	.8988	.4877	2.0503	64° 00'
10	.4410	.8975	.4913	2.0353	50
20	.4436	.8962	.4950	2.0204	40
30	.4462	.8949	.4986	2.0057	30
40	.4488	.8936	.5022	1.9912	20
50	.4514	.8923	.5059	1.9768	10
27° 00'	.4540	.8910	.5095	1.9626	63° 00'
10	.4566	.8897	.5132	1.9486	50
20	.4592	.8884	.5169	1.9347	40
30	.4617	.8870	.5206	1.9210	30
40	.4643	.8857	.5243	1.9074	20
50	.4669	.8843	.5280	1.8940	10
28° 00'	.4695	.8829	.5317	1.8807	62° 00'
10	.4720	.8816	.5354	1.8676	50
20	.4746	.8802	.5392	1.8546	40
30	.4772	.8788	.5430	1.8418	30
40	.4797	.8774	.5467	1.8291	20
50	.4823	.8760	.5505	1.8165	10
29° 00'	.4848	.8746	.5543	1.8040	61° 00'
10	.4874	.8732	.5581	1.7917	50
20	.4899	.8718	.5619	1.7796	40
30	.4924	.8704	.5658	1.7675	30
40	.4950	.8689	.5696	1.7556	20
50	.4975	.8675	.5735	1.7437	10
30° 00'	.5000	.8660	.5774	1.7321	60° 00'
10	.5025	.8646	.5812	1.7205	50
20	.5050	.8631	.5851	1.7090	40
30	.5075	.8616	.5890	1.6977	30
40	.5100	.8601	.5930	1.6864	20
50	.5125	.8587	.5969	1.6753	10
31° 00'	.5150	.8572	.6009	1.6643	59° 00'
10	.5175	.8557	.6048	1.6534	50
20	.5200	.8542	.6088	1.6426	40
30	.5225	.8526	.6128	1.6319	30
40	.5250	.8511	.6168	1.6212	20
50	.5275	.8496	.6208	1.6107	10
32° 00'	.5299	.8480	.6249	1.6003	58° 00'
10	.5324	.8465	.6289	1.5900	50
20	.5348	.8450	.6330	1.5798	40
30	.5373	.8434	.6371	1.5697	30
40	.5398	.8418	.6412	1.5597	20
50	.5422	.8403	.6453	1.5497	10
33° 00'	.5446	.8387	.6494	1.5399	57° 00'
10	.5471	.8371	.6536	1.5301	50
20	.5495	.8355	.6577	1.5204	40
30	.5519	.8339	.6619	1.5108	30
40	.5544	.8323	.6661	1.5013	20
50	.5568	.8307	.6703	1.4919	10
34° 00'	.5592	.8290	.6745	1.4826	56° 00'
10	.5616	.8274	.6787	1.4733	50
20	.5640	.8258	.6830	1.4641	40
30	.5664	.8241	.6873	1.4550	30
40	.5688	.8225	.6916	1.4460	20
50	.5712	.8208	.6959	1.4370	10
35° 00'	.5736	.8192	.7002	1.4281	55° 00'
10	.5760	.8175	.7046	1.4193	50
20	.5783	.8158	.7089	1.4106	40
30	.5807	.8141	.7133	1.4019	30
40	.5831	.8124	.7177	1.3934	20
50	.5854	.8107	.7221	1.3848	54° 10
	cos θ	sin θ	cot θ	tan θ	deg
	When deg=54° 10'~66° 00'				θ

θ	When deg =36° 00' ~45° 00'				
deg	sin θ	cos θ	tan θ	cot θ	
36° 00'	.5878	.8090	.7265	1.3764	54° 00'
10	.5901	.8073	.7310	1.3680	50
20	.5925	.8056	.7355	1.3597	40
30	.5948	.8039	.7400	1.3514	30
40	.5972	.8021	.7445	1.3432	20
50	.5995	.8004	.7490	1.3351	10
37° 00'	.6018	.7986	.7536	1.3270	53° 00'
10	.6041	.7969	.7581	1.3190	50
20	.6065	.7951	.7627	1.3111	40
30	.6088	.7934	.7673	1.3032	30
40	.6111	.7916	.7720	1.2954	20
50	.6134	.7898	.7766	1.2876	10
38° 00'	.6157	.7880	.7813	1.2799	52° 00'
10	.6180	.7862	.7860	1.2723	50
20	.6202	.7844	.7907	1.2647	40
30	.6225	.7826	.7954	1.2572	30
40	.6248	.7808	.8002	1.2497	20
50	.6271	.7790	.8050	1.2423	10
39° 00'	.6293	.7771	.8098	1.2349	51° 00'
10	.6316	.7753	.8146	1.2276	50
20	.6338	.7735	.8195	1.2203	40
30	.6361	.7716	.8243	1.2131	30
40	.6383	.7698	.8292	1.2059	20
50	.6406	.7679	.8342	1.1988	10
40° 00'	.6428	.7660	.8391	1.1918	50° 00'
10	.6450	.7642	.8441	1.1847	50
20	.6472	.7623	.8491	1.1778	40
30	.6494	.7604	.8541	1.1708	30
40	.6517	.7585	.8591	1.1640	20
50	.6539	.7566	.8642	1.1571	10
41° 00'	.6561	.7547	.8693	1.1504	49° 00'
10	.6583	.7528	.8744	1.1436	50
20	.6604	.7509	.8796	1.1369	40
30	.6626	.7490	.8847	1.1303	30
40	.6648	.7470	.8899	1.1237	20
50	.6670	.7451	.8952	1.1171	10
42° 00'	.6691	.7431	.9004	1.1106	48° 00'
10	.6713	.7412	.9057	1.1041	50
20	.6734	.7392	.9110	1.0977	40
30	.6756	.7373	.9163	1.0913	30
40	.6777	.7353	.9217	1.0850	20
50	.6799	.7333	.9271	1.0786	10
43° 00'	.6820	.7314	.9325	1.0724	47° 00'
10	.6841	.7294	.9380	1.0661	50
20	.6862	.7274	.9435	1.0599	40
30	.6884	.7254	.9490	1.0538	30
40	.6905	.7234	.9545	1.0477	20
50	.6926	.7214	.9601	1.0416	10
44° 00'	.6947	.7193	.9657	1.0355	46° 00'
10	.6967	.7173	.9713	1.0295	50
20	.6988	.7153	.9770	1.0235	40
30	.7009	.7133	.9827	1.0176	30
40	.7030	.7112	.9884	1.0117	20
50	.7050	.7092	.9942	1.0058	10
45° 00'	.7071	.7071	1.0000	1.0000	45° 00'
	cos θ	sin θ	cot θ	tan θ	deg
	When deg =45° 00'~54° 00'				θ

■How to Obtain Trigonometrical Functions from the Chart

When deg.（degre）is between 0° 00' and 45° 00'

①Locate the target deg. value in the left-hand side θ column.
②Check the required type of trigonometrical function in the chart s top row, and obtain the real number corresponding to the deg. value from the appropriate column.

ex.）
sin 5° ＝ 0.0872
cos5° ＝ 0.9962
tan 5° ＝ 0.0875
cot 5° ＝11.430

When deg.（degree） is between 45° 00' and 90° 00'

①Locate the target deg. value in the right most column.
②Check the required type of trigonometrical function in the chart's bottom row, and obtain the real number corresponding to the deg. value from the appropriate column.

ex.）
sin 85° ＝ 0.9962
cos85° ＝ 0.0872
tan 85° ＝11.430
cot 85° ＝ 0.0875

If the deg. value contains any fractions, convert it into a degree and minute value.
ex.） 5.5° is 5° 30' (1° ＝60')

〔TECHNICAL DATA〕

FIT SELECTION BASICS／DIMENSIONAL TOLERANCE AND FITS

EXCERPT FROM “USAGE OF JIS SERIES” MANUAL FOR DESIGNING(PRECISION VER.)／EXCERPT FROM JIS B 0401(1986)

			H6	H7	H8	H9	Applicable part	Functional classification		Application example
Can be moved relatively	Clearance fit	Loose fit				c9	The part which allows a large clearance space or the part requires clearance space. The part which can be enlarged to make clearance space to make assembly easier. The part which requires proper clearance space in the high temperature.	Functionally, the part which requires large clearance space { Expanse. Positioning error is large. Length of fit is long.		Piston ring and piston ring groove Fit of loosening safety pin
		Light rolling fit			d9	d9	The part which allows a large clearance space or the part requires clearance space.	For reducing { Production cost Safety cost		Crank web and pin bearing (Side surface) Exhaust valve cage and traveling part of spring sheet Piston ring and piston ring groove
				e7	e8	e9	The part which allows a slight clearance space or the part requires clearance space (high grade fit). The bearing part which has slight clearance space and good lubrication. The bearing part which is working under the condition of high temperature, high speed and high load (high grade pressure feed lubrication).	The general rotating or traveling part. (The condition of good lubrication is required.)		Fit of exhaust valve seat Shoulder Bolts MSB (e9) Main bearing for crankshaft Stopper Bolts STBG (e9) General traveling part Puller Bolts PBNT (e9)
		Rolling fit	f6	f7	f7 f8		Fit which can be mobile due to proper clearance space (high grade fit). The general cold bearing part of grease or oil lubrication.	Ordinary fit parts. (Disassembling is often done.)		Insertion part of cooling exhaust valve cage Return Pins (f6) General shaft and bushing Runner Lock Pins (f6) Lever for link system and bushing
		Precision rolling fit	g5	g6			The continuous rotary part of light load precision machine. Fit which can be mobile in spite of small clearance space (spigot and positioning). Precision traveling part.	The part which requires precision movement without any slack.		Pin for link system and lever Key and key groove Valve stem of precision control valve Pusher Pins PSP (g6)
Cannot be moved relatively	Transition fit	Lubricated fit	h5	h6	h7 h8	h9	Fit which can be moved manually with using a lubricator (high grade positioning). Special precision traveling part. Stationary part which is not of great importance.	Capable of assembling and disas-sembling without damaging components.	Transmission of power cannot be done by only junction power of fit.	Fit of rim and boss Fit of toothed gear of precision gear mechanism Dowel Pins MSTH (h7) Sprue Bushings (h6)
		Push fit	h5 h6	js6			Mounting part which is given a little leeway. High-precision positioning where both are unmobile. Fit which can be assembled and disassembled by wood or lead hammer.			Fit between joint flanges Governor way and pin Fit of rim of toothed gear and boss
		Driving fit	js5	k6			Fit which can be assembled and disassembled by an iron hammer or hand press (Key or such items are required to prevent other components from rotating). High-precision positioning.			Fixation of gear pump shaft and casing Reamer bolt Press-fit Section of Tapered Pin Sets (k6)
			k5	m6			Same as the above for assembling and disassembling High-precision positioning which does not tolerate any clearance space.			Reamer bolt Dowel Pins MSTM (m6) Fixation of piston of hydraulic system and shaft Ball Buttons BBT (k5) Fit of joint flange and shaft
		Light press fit	m5	n6			Fit which requires considerable power for assembling and disassembling. High-precision fixed mounting. (Key or such items are required for large torque transmission.)		Small power can be transmitted by junction power of fit.	Flexible plate coupling and gear (passive side) Precision fit Leader Pins & Bushings (m5) Insertion of valve guide for inlet valve Angular Pins (m5)
	Interference fit	Press fit	n5 n6	p6			Fit which requires much power for assembling and disassembling. (Key or such items are required for large torque transmission.) However, when non-ferrous components are fitted together, press fit power will be activated. Standard press fit fixing between iron and iron or between bronze and copper.	Hard to disassemble without damaging components.		Insertion of valve guide for inlet valve Dowel Pins MST (p6) Fixation of gear and shaft (small torque) Stopper Pins STPN (p6) Flexible plate coupling and gear (active side)
			p5	r6			Same as the above for assembling and disassembling Shrinkage fit, cooling fit and strong press fit for large dimension compo-nents.		Considerable power can be transmitted by junction power of fit.	Joint and shaft
		Strong press fit・Shrinkage fit・Cooling fit	r5	s6			Fixed firmly together, so that permanent assembling can be sought with shrinkage fit, cooling fit and strong press fit for assembling. Press fit for light alloy.			Fixation of bushing for bearing
				t6						Insertion of valve guide for inlet valve Fixation of joint flange and shaft (large torque)
				u6						Fixation of driving gear and boss
				x6						Fixation of bushing for bearing

Printed in red are listed with applicable examples of mold parts.

1.1 Commonly used hole-basis fits

Basic hole	Tolerance zone class of shaft																
	Clearance fit							Transition fit			Interference fit						
H6						g5	h5	js5	k5	m5							
					f6	g6	h6	js6	k6	m6	n6＊	p6＊					
H7					f6	g6	h6	js6	k6	m6	n6	p6＊	r6＊	s6	t6	u6	x6
				e7	f7		h7	js7									
H8					f7		h7										
				e8	f8		h8										
			d9	e9													
H9			d8	e8			h8										
		c9	d9	e9			h9										
H10	b9	c9	d9														

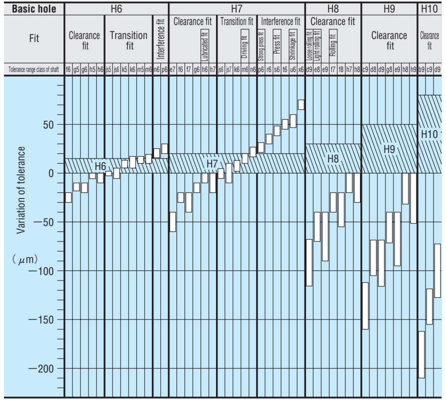
Notice＊Fits will make exceptions according to the size steps.

2.1 Commonly used shaft-basis system of fits

Basic shaft	Tolerance zone class of hole																
	Clearance fit							Transition fit			Interference fit						
h5							H6	JS6	K6	M6	N6＊	P6					
h6					F6	G6	H6	JS6	K6	M6	N6	P6＊					
					F7	G7	H7	JS7	K7	M7	N7	P7＊	R7	S7	T7	U7	X7
h7				E7	F7		H7										
					F8		H8										
h8			D8	E8	F8		H8										
			D9	E9			H9										
h9			D8	E8			H8										
		C9	D9	E9			H9										
	B10	C10	D10														

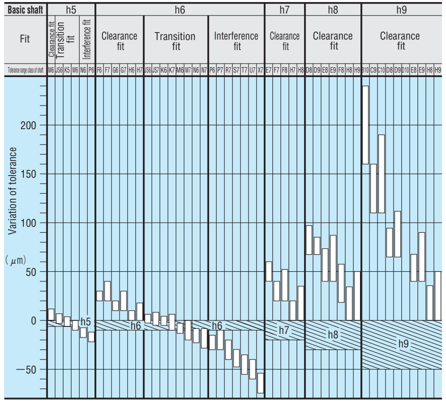
Notice＊Fits will make exceptions according to the size steps.

1.2 Mutual relations of tolerance zone in commonly used hole-basis system of fits



＊This table shows the case when basic size is over 18mm to 30mm.

2.2 Mutual relations of tolerance zone in commonly used shaft-basis system of fits



＊This table shows the case when basic size is over 18mm to 30mm.

〔TECHNICAL DATA〕

TOLERANCE OF COMMONLY USED HOLE FITS／TOLERANCE OF COMMONLY USED SHAFT FITS

EXCERPT FROM JIS B 0401(1986)／EXCERPT FROM JIS B 0401(1986)

Deviations of holes to be used in commonly used fits

Tolerance zone class of hole Unit μm

Basic size step (mm) Over	or less	B10	C9	C10	D8	D9	D10	E7	E8	E9	F6	F7	F8	G6	G7	H6	H7	H8	H9	H10	JS6	JS7	K6	K7	M6	M7	N6	N7	P6	P7	R7	S7	T7	U7	X7
—	3	+180 +140	+85 +60	+100 +60	+34 +20	+45 +20	+60 +20	+24 +14	+28 +14	+39 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+6 0	+10 0	+14 0	+25 0	+40 0	±3	±5	0 −6	0 −10	−2 −8	−2 −12	−4 −10	−4 −14	−6 −12	−6 −16	−10 −20	−14 −24	—	−18 −28	−20 −30
3	6	+188 +140	+100 +70	+118 +70	+48 +30	+60 +30	+78 +30	+32 +20	+38 +20	+50 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+8 0	+12 0	+18 0	+30 0	+48 0	±4	±6	+2 −6	+3 −9	−1 −9	0 −12	−5 −13	−4 −16	−9 −17	−8 −20	−11 −23	−15 −27	—	−19 −31	−24 −36
6	10	+208 +150	+116 +80	+138 +80	+62 +40	+76 +40	+98 +40	+40 +25	+47 +25	+61 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+9 0	+15 0	+22 0	+36 0	+58 0	±4.5	±7	+2 −7	+5 −10	−3 −12	0 −15	−7 −16	−4 −19	−12 −21	−9 −24	−13 −28	−17 −32	—	−22 −37	−28 −43
10	14	+220 +150	+138 +95	+165 +95	+77 +50	+93 +50	+120 +50	+50 +32	+59 +32	+75 +32	+27 +16	+34 +16	+43 +16	+17 +6	+24 +6	+11 0	+18 0	+27 0	+43 0	+70 0	±5.5	±9	+2 −9	+6 −12	−4 −15	0 −18	−9 −20	−5 −23	−15 −26	−11 −29	−16 −34	−21 −39	—	−26 −44	−33 −51
14	18																																		−38 −56
18	24	+244 +160	+162 +110	+194 +110	+98 +65	+117 +65	+149 +65	+61 +40	+73 +40	+92 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+13 0	+21 0	+33 0	+52 0	+84 0	±6.5	±10	+2 −11	+6 −15	−4 −17	0 −21	−11 −24	−7 −28	−18 −31	−14 −35	−20 −41	−27 −48	—	−33 −54	−46 −67
24	30																																−33 −54	−40 −61	−56 −77
30	40	+270 +170	+182 +120	+220 +120	+119 +80	+142 +80	+180 +80	+75 +50	+89 +50	+112 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+16 0	+25 0	+39 0	+62 0	+100 0	±8	±12	+3 −13	+7 −18	−4 −20	0 −25	−12 −28	−8 −33	−21 −37	−17 −42	−25 −50	−34 −59	−39 −64	−51 −76	—
40	50	+280 +180	+192 +130	+230 +130																													−45 −70	−61 −86	
50	65	+310 +190	+214 +140	+260 +140	+146 +100	+174 +100	+220 +100	+90 +60	+106 +60	+134 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+19 0	+30 0	+46 0	+74 0	+120 0	±9.5	±15	+4 −15	+9 −21	−5 −24	0 −30	−14 −33	−9 −39	−26 −45	−21 −51	−30 −60	−42 −72	−55 −85	−76 −106	—
65	80	+320 +200	+224 +150	+270 +150																											−32 −62	−48 −78	−64 −94	−91 −121	
80	100	+360 +220	+257 +170	+310 +170	+174 +120	+207 +120	+260 +120	+107 +72	+126 +72	+159 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+22 0	+35 0	+54 0	+87 0	+140 0	±11	±17	+4 −18	+10 −25	−6 −28	0 −35	−16 −38	−10 −45	−30 −52	−24 −59	−38 −73	−58 −93	−78 −113	−111 −146	—
100	120	+380 +240	+267 +180	+320 +180																											−41 −76	−66 −101	−91 −126	−131 −166	
120	140	+420 +260	+300 +200	+360 +200	+208 +145	+245 +145	+305 +145	+125 +85	+148 +85	+185 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+25 0	+40 0	+63 0	+100 0	+160 0	±12.5	±20	+4 −21	+12 −28	−8 −33	0 −40	−20 −45	−12 −52	−36 −61	−28 −68	−48 −88	−77 −117	−107 −147	—	—
140	160	+440 +280	+310 +210	+370 +210																											−50 −90	−85 −125	−119 −159		
160	180	+470 +310	+330 +230	+390 +230																											−53 −93	−93 −133	−131 −171		
180	200	+525 +340	+355 +240	+425 +240	+242 +170	+285 +170	+355 +170	+146 +100	+172 +100	+215 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+29 0	+46 0	+72 0	+115 0	+185 0	±14.5	±23	+5 −24	+13 −33	−8 −37	0 −46	−22 −51	−14 −60	−41 −70	−33 −79	−60 −106	−105 −151	—	—	—
200	225	+565 +380	+375 +260	+445 +260																											−63 −109	−113 −159			
225	250	+605 +420	+395 +280	+465 +280																											−67 −113	−123 −169			
250	280	+690 +480	+430 +300	+510 +300	+271 +190	+320 +190	+400 +190	+162 +110	+191 +110	+240 +110	+88 +56	+108 +56	+137 +56	+49 +17	+69 +17	+32 0	+52 0	+81 0	+130 0	+210 0	±16	±26	+5 −27	+16 −36	−9 −41	0 −52	−25 −57	−14 −66	−47 −79	−36 −88	−74 −126	—	—	—	—
280	315	+750 +540	+460 +330	+540 +330																											−78 −130				
315	355	+830 +600	+500 +360	+590 +360	+299 +210	+350 +210	+440 +210	+182 +125	+214 +125	+265 +125	+98 +62	+119 +62	+151 +62	+54 +18	+75 +18	+36 0	+57 0	+89 0	+140 0	+230 0	±18	±28	+7 −29	+17 −40	−10 −46	0 −57	−26 −62	−16 −73	−51 −87	−41 −98	−87 −144	—	—	—	—
355	400	+910 +680	+540 +400	+630 +400																											−93 −150				
400	450	+1010 +760	+595 +440	+690 +440	+327 +230	+385 +230	+480 +230	+198 +135	+232 +135	+290 +135	+108 +68	+131 +68	+165 +68	+60 +20	+83 +20	+40 0	+63 0	+97 0	+155 0	+250 0	±20	±31	+8 −32	+18 −45	−10 −50	0 −63	−27 −67	−17 −80	−55 −95	−45 −108	−103 −166	—	—	—	—
450	500	+1090 +840	+635 +480	+730 +480																											−109 −172				

Note: This table shows that the upper figures are the upper deviation and the lower figures are the lower deviation.

Deviations of shafts to be used in commonly used fits

Tolerance Zone class of shaft Unit μm

Basic size step (mm) Over	or less	b9	c9	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	h5	h6	h7	h8	h9	js5	js6	js7	k5	k6	m5	m6	n5＊	n6	p6	r6	s6	t6	u6	x6
—	3	−140 −165	−60 −85	−20 −34	−20 −45	−14 −24	−14 −28	−14 −39	−6 −12	−6 −16	−6 −20	−2 −6	−2 −8	0 −4	0 −6	0 −10	0 −14	0 −25	±2	±3	±5	+4 0	+6 0	+6 +2	+8 +2	+8 +4	+10 +4	+12 +6	+16 +10	+20 +14	—	+24 +18	+26 +20
3	6	−140 −170	−70 −100	−30 −48	−30 −60	−20 −32	−20 −38	−20 −50	−10 −18	−10 −22	−10 −28	−4 −9	−4 −12	0 −5	0 −8	0 −12	0 −18	0 −30	±2.5	±4	±6	+6 +1	+9 +1	+9 +4	+12 +4	+13 +8	+16 +8	+20 +12	+23 +15	+27 +19	—	+31 +23	+36 +28
6	10	−150 −186	−80 −116	−40 −62	−40 −76	−25 −40	−25 −47	−25 −61	−13 −22	−13 −28	−13 −35	−5 −11	−5 −14	0 −6	0 −9	0 −15	0 −22	0 −36	±3	±4.5	±7	+7 +1	+10 +1	+12 +6	+15 +6	+16 +10	+19 +10	+24 +15	+28 +19	+32 +23	—	+37 +28	+43 +34
10	14	−150 −193	−95 −138	−50 −77	−50 −93	−32 −50	−32 −59	−32 −75	−16 −27	−16 −34	−16 −43	−6 −14	−6 −17	0 −8	0 −11	0 −18	0 −27	0 −43	±4	±5.5	±9	+9 +1	+12 +1	+15 +7	+18 +7	+20 +12	+23 +12	+29 +18	+34 +23	+39 +28	—	+44 +33	+51 +40
14	18																																+56 +45
18	24	−160 −212	−110 −162	−65 −98	−65 −117	−40 −61	−40 −73	−40 −92	−20 −33	−20 −41	−20 −53	−7 −16	−7 −20	0 −9	0 −13	0 −21	0 −33	0 −52	±4.5	±6.5	±10	+11 +2	+15 +2	+17 +8	+21 +8	+24 +15	+28 +15	+35 +22	+41 +28	+48 +35	—	+54 +41	+67 +54
24	30																														+54 +41	+61 +48	+77 +64
30	40	−170 −232	−120 −182	−80 −119	−80 −142	−50 −75	−50 −89	−50 −112	−25 −41	−25 −50	−25 −64	−9 −20	−9 −25	0 −11	0 −16	0 −25	0 −39	0 −62	±5.5	±8	±12	+13 +2	+18 +2	+20 +9	+25 +9	+28 +17	+33 +17	+42 +26	+50 +34	+59 +43	+64 +48	+76 +60	—
40	50	−180 −242	−130 −192																												+70 +54	+86 +70	
50	65	−190 −264	−140 −214	−100 −146	−100 −174	−60 −90	−60 −106	−60 −134	−30 −49	−30 −60	−30 −76	−10 −23	−10 −29	0 −13	0 −19	0 −30	0 −46	0 −74	±6.5	±9.5	±15	+15 +2	+21 +2	+24 +11	+30 +11	+33 +20	+39 +20	+51 +32	+60 +41	+72 +53	+85 +66	+106 +87	—
65	80	−200 −274	−150 −224																										+62 +43	+78 +59	+94 +75	+121 +102	
80	100	−220 −307	−170 −257	−120 −174	−120 −207	−72 −107	−72 −126	−72 −159	−36 −58	−36 −71	−36 −90	−12 −27	−12 −34	0 −15	0 −22	0 −35	0 −54	0 −87	±7.5	±11	±17	+18 +3	+25 +3	+28 +13	+35 +13	+38 +23	+45 +23	+59 +37	+73 +51	+93 +71	+113 +91	+146 +124	—
100	120	−240 −327	−180 −267																										+76 +54	+101 +79	+126 +104	+166 +144	
120	140	−260 −360	−200 −300	−145 −208	−145 −245	−85 −125	−85 −148	−85 −185	−43 −68	−43 −83	−43 −106	−14 −32	−14 −39	0 −18	0 −25	0 −40	0 −63	0 −100	±9	±12.5	±20	+21 +3	+28 +3	+33 +15	+40 +15	—	+52 +27	+68 +43	+88 +63	+117 +92	+147 +122	—	—
140	160	−280 −380	−210 −310																										+90 +65	+125 +100	+159 +134		
160	180	−310 −410	−230 −330																										+93 +68	+133 +108	+171 +146		
180	200	−340 −455	−240 −355	−170 −242	−170 −285	−100 −146	−100 −172	−100 −215	−50 −79	−50 −96	−50 −122	−15 −35	−15 −44	0 −20	0 −29	0 −46	0 −72	0 −115	±10	±14.5	±23	+24 +4	+33 +4	+37 +17	+46 +17	—	+60 +31	+79 +50	+106 +77	+151 +122	—	—	—
200	225	−380 −495	−260 −375																										+109 +80	+159 +130			
225	250	−420 −535	−280 −395																										+113 +84	+169 +140			
250	280	−480 −610	−300 −430	−190 −271	−190 −320	−110 −162	−110 −191	−110 −240	−56 −88	−56 −108	−56 −137	−17 −40	−17 −49	0 −23	0 −32	0 −52	0 −81	0 −130	±11.5	±16	±26	+27 +4	+36 +4	+43 +20	+52 +20	—	+66 +34	+88 +56	+126 +94	—	—	—	—
280	315	−540 −670	−330 −460																										+130 +98				
315	355	−600 −740	−360 −500	−210 −299	−210 −350	−125 −182	−125 −214	−125 −265	−62 −98	−62 −119	−62 −151	−18 −43	−18 −54	0 −25	0 −36	0 −57	0 −89	0 −140	±12.5	±18	±28	+29 +4	+40 +4	+46 +21	+57 +21	—	+73 +37	+98 +62	+144 +108	—	—	—	—
355	400	−680 −820	−400 −540																										+150 +114				
400	450	−760 −915	−440 −595	−230 −327	−230 −385	−135 −198	−135 −232	−135 −290	−68 −108	−68 −131	−68 −165	−20 −47	−20 −60	0 −27	0 −40	0 −63	0 −97	0 −155	±13.5	±20	±31	+32 +5	+45 +5	+50 +23	+63 +23	—	+80 +40	+108 +68	+166 +126	—	—	—	—
450	500	−840 −995	−480 −635																										+172 +132				

Note:This table shows that the upper figures are the upper deviation and the lower figures are the lower deviation.

〔TECHNICAL DATA〕

CONVERSION TABLE OF HARDNESS

EXCERPT FROM SAE J 417(1983)

Conversion table for approximate values for steel according to Rockwell hardness C scale⁽¹⁾

Rockwell hardness C scale (HRC)	Vickers hardness (HV)	Brinell hardness (HB) Ball : 10mm in diameter/Load : 3000kgf		Rockwell hardness⁽³⁾			Rockwell superficial hardness Diamond conical penetrator			Shore hardness (Hs)	Tensile strength (Approximate value) MPa (kgf/mm²) ⁽²⁾	Rockwell hardness C scale⁽³⁾
		Standard ball	Tungsten carbide ball	A scale (HRA) Load : 60kgf Diamond conical penetrator	B scale (HRB) Load : 100kgf Ball of 1.6mm (1/16") dia.	D scale (HRD) Load : 100kgf Diamond conical penetrator	15-N Scale Load : 15kgf	30-N Scale Load : 30kgf	45-N Scale Load : 45kgf			
68	940	—	—	85.6	—	76.9	93.2	84.4	75.4	97	—	68
67	900	—	—	85.0	—	76.1	92.9	83.6	74.2	95	—	67
66	865	—	—	84.5	—	75.4	92.5	82.8	73.3	92	—	66
65	832	—	(739)	83.9	—	74.5	92.2	81.9	72.0	91	—	65
64	800	—	(722)	83.4	—	73.8	91.8	81.1	71.0	88	—	64
63	772	—	(705)	82.8	—	73.0	91.4	80.1	69.9	87	—	63
62	746	—	(688)	82.3	—	72.2	91.1	79.3	68.8	85	—	62
61	720	—	(670)	81.8	—	71.5	90.7	78.4	67.7	83	—	61
60	697	—	(654)	81.2	—	70.7	90.2	77.5	66.6	81	—	60
59	674	—	(634)	80.7	—	69.9	89.8	76.6	65.5	80	—	59
58	653	—	615	80.1	—	69.2	89.3	75.7	64.3	78	—	58
57	633	—	595	79.6	—	68.5	88.9	74.8	63.2	76	—	57
56	613	—	577	79.0	—	67.7	88.3	73.9	62.0	75	—	56
55	595	—	560	78.5	—	66.9	87.9	73.0	60.9	74	2075 (212)	55
54	577	—	543	78.0	—	66.1	87.4	72.0	59.8	72	2015 (205)	54
53	560	—	525	77.4	—	65.4	86.9	71.2	58.5	71	1950 (199)	53
52	544	(500)	512	76.8	—	64.6	86.4	70.2	57.4	69	1880 (192)	52
51	528	(487)	496	76.3	—	63.8	85.9	69.4	56.1	68	1820 (186)	51
50	513	(475)	481	75.9	—	63.1	85.5	68.5	55.0	67	1760 (179)	50
49	498	(464)	469	75.2	—	62.1	85.0	67.6	53.8	66	1695 (173)	49
48	484	451	455	74.7	—	61.4	84.5	66.7	52.5	64	1635 (167)	48
47	471	442	443	74.1	—	60.8	83.9	65.8	51.4	63	1580 (161)	47
46	458	432	432	73.6	—	60.0	83.5	64.8	50.3	62	1530 (156)	46
45	446	421	421	73.1	—	59.2	83.0	64.0	49.0	60	1480 (151)	45
44	434	409	409	72.5	—	58.5	82.5	63.1	47.8	58	1435 (146)	44
43	423	400	400	72.0	—	57.7	82.0	62.2	46.7	57	1385 (141)	43
42	412	390	390	71.5	—	56.9	81.5	61.3	45.5	56	1340 (136)	42
41	402	381	381	70.9	—	56.2	80.9	60.4	44.3	55	1295 (132)	41
40	392	371	371	70.4	—	55.4	80.4	59.5	43.1	54	1250 (127)	40
39	382	362	362	69.9	—	54.6	79.9	58.6	41.9	52	1215 (124)	39
38	372	353	353	69.4	—	53.8	79.4	57.7	40.8	51	1180 (120)	38
37	363	344	344	68.9	—	53.1	78.8	56.8	39.6	50	1160 (118)	37
36	354	336	336	68.4	(109.0)	52.3	78.3	55.9	38.4	49	1115 (114)	36
35	345	327	327	67.9	(108.5)	51.5	77.7	55.0	37.2	48	1080 (110)	35
34	336	319	319	67.4	(108.0)	50.8	77.2	54.2	36.1	47	1055 (108)	34
33	327	311	311	66.8	(107.5)	50.0	76.6	53.3	34.9	46	1025 (105)	33
32	318	301	301	66.3	(107.0)	49.2	76.1	52.1	33.7	44	1000 (102)	32
31	310	294	294	65.8	(106.0)	48.4	75.6	51.3	32.7	43	980 (100)	31
30	302	286	286	65.3	(105.5)	47.7	75.0	50.4	31.3	42	950 (97)	30
29	294	279	279	64.7	(104.5)	47.0	74.5	49.5	30.1	41	930 (95)	29
28	286	271	271	64.3	(104.0)	46.1	73.9	48.6	28.9	41	910 (93)	28
27	279	264	264	63.8	(103.0)	45.2	73.3	47.7	27.8	40	880 (90)	27
26	272	258	258	63.3	(102.5)	44.6	72.8	46.8	26.7	38	860 (88)	26
25	266	253	253	62.8	(101.5)	43.8	72.2	45.9	25.5	38	840 (86)	25
24	260	247	247	62.4	(101.0)	43.1	71.6	45.0	24.3	37	825 (84)	24
23	254	243	243	62.0	100.0	42.1	71.0	44.0	23.1	36	805 (82)	23
22	248	237	237	61.5	99.0	41.6	70.5	43.2	22.0	35	785 (80)	22
21	243	231	231	61.0	98.5	40.9	69.9	42.3	20.7	35	770 (79)	21
20	238	226	226	60.5	97.8	40.1	69.4	41.5	19.6	34	760 (77)	20
(18)	230	219	219	—	96.7	—	—	—	—	33	730 (75)	(18)
(16)	222	212	212	—	95.5	—	—	—	—	32	705 (72)	(16)
(14)	213	203	203	—	93.9	—	—	—	—	31	675 (69)	(14)
(12)	204	194	194	—	92.3	—	—	—	—	29	650 (66)	(12)
(10)	196	187	187	—	90.7	—	—	—	—	28	620 (63)	(10)
(8)	188	179	179	—	89.5	—	—	—	—	27	600 (61)	(8)
(6)	180	171	171	—	87.1	—	—	—	—	26	580 (59)	(6)
(4)	173	165	165	—	85.5	—	—	—	—	25	550 (56)	(4)
(2)	166	158	158	—	83.5	—	—	—	—	24	530 (54)	(2)
(0)	160	152	152	—	81.7	—	—	—	—	24	515 (53)	(0)

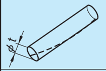
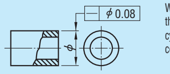
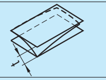
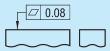
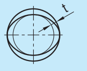
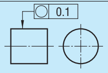
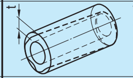
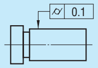
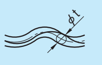
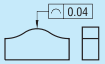
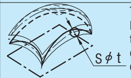
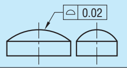
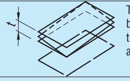
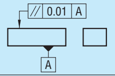
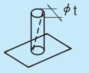
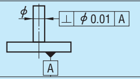
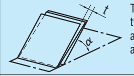
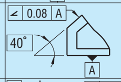
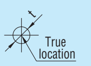
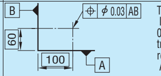
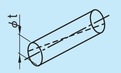
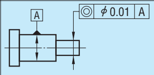
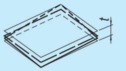
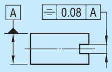
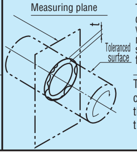
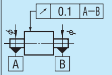
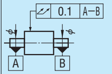
Notes :
⁽¹⁾ The figures in blue are based on Table 1 of ASTM E 140(adjusted by SAE, ASM and ASTM in collaboration).
⁽²⁾ The values and units in parentheses have been converted from psi based on conversion tables of JIS Z 8413 and Z 8438. 1MPa=1N／mm²
⁽³⁾ The figures in parentheses are less frequently used values and are for reference only.

〔TECHNICAL DATA〕

INDICATIONS OF GEOMETRICAL TOLERANCE ON DRAWINGS

EXCERPT FROM JIS B 0021(1984)

Kinds and Symbols of Geometrical Tolerances

Kind of tolerance		Symbol	Definition of tolerance zone		Examples of diagrammatical indication and its interpretation	
Form tolerance	Straightness tolerance	⏤		Where symbol φ is attached before the numerical value indicating a tolerance zone, this tolerance zone is a zone in a cylinder of diameter t.		Where a tolerance frame is connected to the dimension showing the diameter of a cylinder, the axis of the cylinder shall be contained a cylinder of 0.08mm diameter.
	Flatness tolerance	⏥		The tolerance zone is a zone held between two parallel planes a distance t apart.		This surface shall be contained between two parallel planes 0.08mm apart.
	Circularity tolerance	○		The tolerance zone in the considered plane is a zone between two concentric circles a distance t apart.		The circumference in any section normal to the axis shall be contained between two concentric circles 0.1mm apart on the same plane.
	Cylindricity tolerance	⌭		The tolerance zone is a zone contained between two coaxial cylinder surfaces a distance t apart.		The considered surface shall be contained between two coaxial cylinder surfaces 0.1mm apart.
	Profile tolerance of line	⌒		The tolerance zone is a zone held between two lines enveloping circles of diameter t, the centers of which are situated on a theoretically exact profile line.		In any cross-section parallel to the projection plane the considered profile shall be contained between two lines enveloping circles of 0.04mm in diameter, the centers of which are situated on a line having the theoretically exact profile.
	Profile tolerance of surface	⌓		The tolerance zone is a zone held between the two surfaces enveloping the spheres of diameter t, the centers of which are situated on a theoretically exact profile surface.		The considered surface shall be contained between two surfaces enveloping the spheres of diameter 0.02mm, the centers of which are situated on a surface having the theoretically exact profile.
Orientation tolerance	Parallelism tolerance	∥		The tolerance zone is a zone held between two parallel planes parallel to the datum plane and a distance t apart from each other.		The surface shown by the arrow of the leader line shall be contained between two planes parallel to the datum plane A and 0.01mm apart from each other in the direction of the arrow of the leader line.
	Perpendicularity tolerance	⊥		Where symbol φ is attached before the numerical value indicating the tolerance, the tolerance zone is a zone within a cylinder of diameter t perpendicular to the datum plane.		The axis of the cylinder shown by the arrow of the leader line shall be contained within a cylinder of diameter 0.01mm perpendicular to the datum plane A.
	Angularity tolerance	∠		The tolerance zone is a zone held between two parallel planes inclined at the specified angle to the datum plane and a distance t apart from each other.		The surface shown by the arrow of the leader line shall be contained between two parallel planes which are inclined at 40° with theoretical exactness to the datum plane A and which are 0.08mm apart from each other in the direction of the arrow of the leader line.
Location tolerance	Positional tolerance	⌖		The tolerance zone is a zone within a circle or sphere of diameter t having its center at the theoretically exact location, hereinafter referred to as the "true location".		The point shown by the arrow of the leader line shall be contained within a circle of 0.03mm diameter having its center at the true location 60mm and 100mm apart, respectively,from the datum straight line A and from the datum straight line B.
	Coaxiality tolerance or concentricity tolerance	◎		Where symbol φ is attached before the numerical value indicating the tolerance, the tolerance zone is a zone within a cylinder of diameter t whose axis agrees with the datum axial straight line.		The axis shown by the arrow of the leader line shall be contained within a cylinder of 0.01mm diameter whose axis agrees with the datum axial straight line A.
	Symmetry tolerance	⌯		The tolerance zone is a zone held between two parallel planes a distance t apart from each other and arranged symmetrically about the datum median plane.		The median surface shown by the arrow of the leader line shall be contained between two parallel planes 0.08mm apart from each other and arranged symmetrically about the datum median plane A.
Run-out tolerance	Circular run-out tolerance	↗		The tolerance is a zone between two concentric circles whose centers agree with the datum axial straight line on any measuring plane normal to the datum axial straight line and which are a distance t apart from each other in the radial direction.		The run-out in the radial direction of the cylinder surface shown by the arrow of the leader line shall not exceed 0.1mm on any measuring plane normal to the datum axial straight line when the cylinder is rotated by one rotation about the datum axial straight line A-B.
	Total run-out tolerance	⌰		The tolerance zone is a zone between two coaxial cylinders having axes agreeing with the datum axial straight line and a distance t apart from each other in the radial direction.		The total radial run-out of the cylinder surface shown by the arrow of the leader line shall not exceed 0.1mm at any point on the cylinder surface when the cylinder part is rotated about the datum axial straight line A-B with a relative movement in the axial direction.

Lines used in the drawings in the column of "definition of tolerance zone" indicate the following meanings :

Thick solid line or broken line：Feature	Thin alternate long and short dash line：Center line
Thick alternate long and short dash line：Datum	Thin alternate long and two short dashes line：Supplementary projection plane or sectional plane
Thin solid line or broken line：Tolerance zone	Thick alternate long and two short dashes line：Projection of a feature to supplementary Projection plane or sectional plane

SURFACE ROUGHNESS

EXCERPT FROM JIS B 0601(1994) AND JIS B 0031(1994)

Categories of surface roughness

Definitions and indications for surface roughness parameters (for industrial products) are specified. They are arithmetical mean roughness (Ra), maximum height (Ry), ten-point mean roughness (Rz), mean spacing of profile irregularities (Sm), mean spacing of local peaks of theprofile (S) and profile bearing length ratio (tp). Surface roughness is given as the arithmetical mean value for a randomly sampled area.

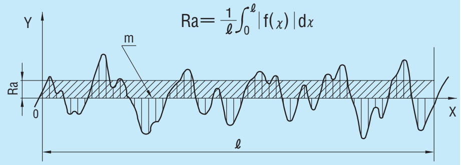
〔Mean center line roughness (Ra_{75}) is defined in the annexes of JIS B 0031 and JIS B 0601.〕

Typical ways for obtaining surface roughness

Arithmetical mean roughness (Ra)

A section of standard length is sampled from the mean line on the roughness chart. The mean line is laid on a Cartesian coordinate system where in the mean line runs in the direction of the x-axis and magnification is the y-axis. The value obtained with the formula on the right is expressed in micrometer (μm) when y=f (χ).

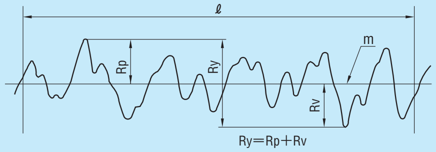
$$Ra = \frac{1}{\ell}\int_0^{\ell} |f(\chi)|\,d\chi$$



Maximum peak (Ry)

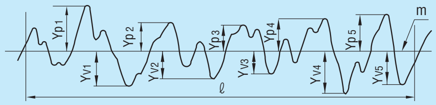
A section of standard length is sampled from the mean line on the roughness chart. The distance between the peaks and valleys of the sampled line is measured in the y direction. The value is expressed in micrometer (μm).

Note: To obtain Ry, sample only the standard length. The part, where peaks and valleys are wide enough to be interpreted as scratches, should be avoided.



Ten-point mean roughness (Rz)

A section of standard length is sampled from the mean line on the roughness chart. The distance between the peaks and valleys of the sampled line is measured in the y direction. Then, the average peak is obtained among 5 tallest peaks (Yp), as is the average valley between 5 lowest valleys (Yv). The sum of these two values is expressed in micrometer (μm).



$$Rz = \frac{|Yp_1+Yp_2+Yp_3+Yp_4+Yp_5| + |Yv_1+Yv_2+Yv_3+Yv_4+Yv_5|}{5}$$

Yp1、Yp2、Yp3、Yp4、Yp5：Tallest 5 peaks within sample

Yv1、Yv2、Yv3、Yv4、Yv5：Lowest 5 peaks within sample

Reference：Relationship between arithmetical mean roughness (Ra) and conventional symbols

Arithmetical mean roughness Ra			Max. height Ry	Ten-point mean roughness Rz	Standard length of Ry・Rz ℓ(mm)	Triangular indication
Preferred number series	Cut-off value c (mm)	Indication of surface texture on drawings	Preferred number series			
0.012 a	0.08	0.012 ~ 0.2	0.05 s	0.05 z	0.08	▽▽▽▽
0.025 a	0.25		0.1 s	0.1 z		
0.05 a			0.2 s	0.2 z	0.25	
0.1 a	0.8		0.4 s	0.4 z		
0.2 a			0.8 s	0.8 z	0.8	
0.4 a		0.4 ~ 1.6	1.6 s	1.6 z		▽▽▽
0.8 a			3.2 s	3.2 z		
1.6 a			6.3 s	6.3 z		
3.2 a	2.5	3.2 ~ 6.3	12.5 s	12.5 z	2.5	▽▽
6.3 a			25 s	25 z		
12.5 a	8	12.5 ~ 25	50 s	50 z		▽
25 a			100 s	100 z	8	
50 a		50 ~ 100	200 s	200 z		～
100 a	—		400 s	400 z	—	

※The interdependence for 3 classes is not strictly enforced.

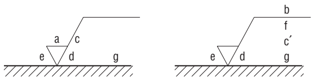
※The evaluation lengths of Ra： Ry and Rz：Five times the cut-off value and standard length respectively.

TECHNICAL DRAWINGS-METHOD OF INDICATING SURFACE TEXTURE ON DRAWING

EXCERPT FROM JIS Z B0031(1994)

Positions of respective indicating symbols relative to indicating symbol of surface

Each grain surface position is indicated as shown in Drawing 7 This includes surface roughness, cutoff value or reference length, processing method, symbol of direction of lay, surface waviness, etc.



Drawing7 Entry position of each indication

a：Value of Ra

b：Processing method

c：Cutoff value・valuation length

c´：Reference length・valuation length

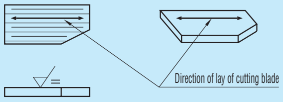
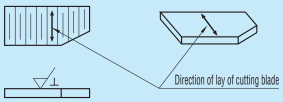
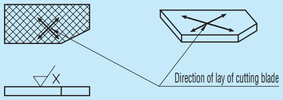
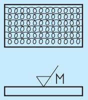
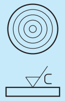
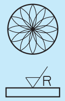
d：Symbol of direction of lay

f：Parameter other than Ra (With tp, parameter/cutoff level)

g：Surface waviness (according to JIS B 0610)

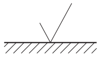
Note： Items other than a and f are added as necessary.

Reference： The location of lay of e in Drawing7 is given as the finish allowance in ISO 1302.

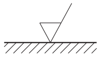
Symbol	Meaning	Figure
=	Parallel to the projected surface on which the direction of lay of the cutting blade is indicated. (ex) Shaped surface	 Direction of lay of cutting blade
⊥	Direction of lay of cutting blade (ex) Shaped surface (when viewed from the side), machined or cylindrical ground surface.	 Direction of lay of cutting blade
X	Intersection of two diagonal lines on the projected surface on which the direction of lay of the cutting blade is indicated. (ex) Honing finished surface	 Direction of lay of cutting blade
M	Multidirectional intersection or non-directional point on the projected surface on which the direction of lay of the cutting blade is indicated. (ex) Rapping finished surface, super finished surface, face milled or end milled surface in surfacing feed direction	
C	Concentric circles roughly centered on the same on the surface on which the direction of lay of the cutting blade is indicated. (ex) Facing surface	
R	Radiating shape roughly centered on the same point on the surface on which the direction of lay of the cutting blade is indicated.	

■Examples Indicating Surface Texture on Drawing

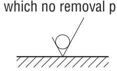
Indicating symbol of surface



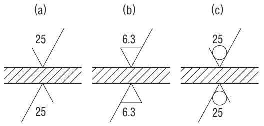
Indicating symbol of surface requiring removal press



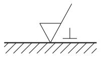
Indicating symbol of surface on which no removal process is permitted



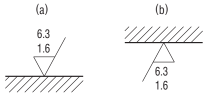
Examples indicating the upper limits of Ra



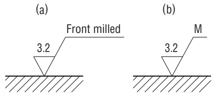
Examples indicating direction of lay



Examples indicating the upper limit and lower limit of Ra



Examples indicating processing method

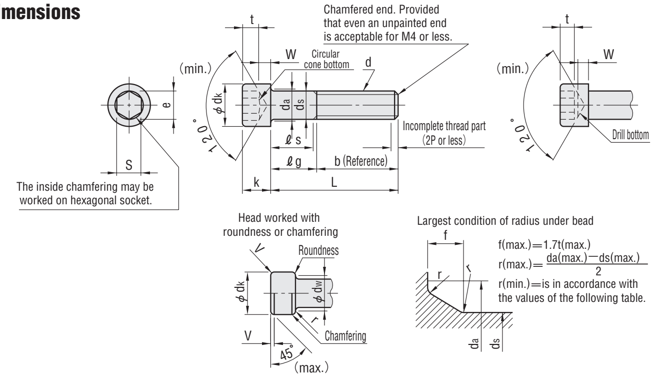


〔TECHNICAL DATA〕

SOCKET HEAD CAP SCREWS

EXCERPT FROM JIS B 1176(1999・2000)

1. Shapes and dimensions


t
W
Circular cone bottom
d
Chamfered end. Provided that even an unpainted end is acceptable for M4 or less.
(min.)
e
φdk
da
ds
120°
S
The inside chamfering may be worked on hexagonal socket.
ℓs
ℓg
b (Reference)
k
L
Incomplete thread part (2P or less)
t
W
(min.)
120°
Drill bottom
Head worked with roundness or chamfering
Roundness
V
φdk
φdw
r
Chamfering
V
45°
(max.)
Largest condition of radius under bead
f
r
r
da
ds

f(max.)=1.7t(max.)

$r(\text{max.}) = \dfrac{d_a(\text{max.}) - d_s(\text{max.})}{2}$

r(min.)=is in accordance with the values of the following table.

Unit: mm

Nominal diameter of thread (d)(15)		M3	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24	(M27)	M30
Pitch of screw thread(P)		0.5	0.7	0.8	1	1.25	1.5	1.75	2	2	2.5	2.5	2.5	3	3	3.5
b	Reference	18	20	22	24	28	32	36	40	44	48	52	56	60	66	72
d_k	Max. (Basic size)*	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
	Max.**	5.68	7.22	8.72	10.22	13.27	16.27	18.27	21.33	24.33	27.33	30.33	33.39	36.39	40.39	45.39
	Min.	5.32	6.78	8.28	9.78	12.73	15.73	17.73	20.67	23.67	26.67	29.67	32.61	35.61	39.61	44.61
d_a	Max.	3.6	4.7	5.7	6.8	9.2	11.2	13.7	15.7	17.7	20.2	22.4	24.4	26.4	30.4	33.4
d_s	Max. (Basic size)	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
	Min.	2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	17.73	19.67	21.67	23.67	26.67	29.67
e	Min.	2.87	3.44	4.58	5.72	6.86	9.15	11.43	13.72	16.00	16.00	19.44	19.44	21.73	21.73	25.15
f	Max.	0.51	0.60	0.60	0.68	1.02	1.02	1.45	1.45	1.45	1.87	2.04	2.04	2.04	2.89	2.89
k	Max. (Basic size)	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
	Min.	2.86	3.82	4.82	5.70	7.64	9.64	11.57	13.57	15.57	17.57	19.48	21.48	23.48	26.48	29.48
r	Min.	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.6	0.8	0.8	0.8	1	1
s	Nominal designation (Basic size)	2.5	3	4	5	6	8	10	12	14	14	17	17	19	19	22
	Min.	2.52	3.02	4.02	5.02	6.02	8.025	10.025	12.032	14.032	14.032	17.050	17.050	19.065	19.065	22.065
	Max.(14) Column 1	2.580	3.080	4.095	5.140	6.140	8.175	10.175	12.212	14.212	14.212	17.230	17.230	19.275	19.275	22.275
	Max.(14) Column 2	2.560	3.080	4.095	5.095	6.095	8.115	10.115	12.142	14.142	14.142					
t	Min.	1.3	2	2.5	3	4	5	6	7	8	9	10	11	12	13.5	15.5
v	Max.	0.3	0.4	0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.7	3
d_w	Min.	5.07	6.53	8.03	9.38	12.33	15.33	17.23	20.17	23.17	25.87	28.87	31.81	34.81	38.61	43.61
w	Min.	1.15	1.4	1.9	2.3	3.3	4	4.8	5.8	6.8	7.7	8.6	9.5	10.4	12.1	13.1

Notes (14) The column 1 of s (max.) shall apply to cap screws of 8.8 and 10.9 in strength division and those of A 2-50 and A 2-70 in property division. The column 2 shall apply to cap screws of 12.9 in strength division. Provided that the column 1 can apply to those of 12.9 in strength division in accordance with the agreement between the purchaser and the manufacturer. Furthermore, the s (max.) of M 20 and over in nominal designation of screw thread shall apply to all of cap screws strength division and property division.

Notes (15) Cap screws having a nominal designation appended with parentheses shall not be used as far as possible.

Remarks

1. The flank of head part shall be appended with a knurl (see JIS B 0951) of paralleled or crossed. In this case, dk (max.) shall be the value of ＊＊ given in this table.Furthermore, where the cap screws without knurl are required, the orderer shall specify it. Provided that dk (max.) shall be the value of ＊ given in this table.
2. The nominal length (ℓ) recommendable to the nominal designation of screw thread shall be within the frame of bold lines. Furthermore, the cap screws shorter than the position of dotted line in nominal length ℓ shall be whole threads and the length of the incomplete thread at the underhead part shall be approx. 3 P.
3. The ℓ_g (max.) and ℓ_s (min.) for the cap screw, of which the nominal length (ℓ) is longer than the position of dotted line, shall be in accordance with the following formula:

$\ell_g(\text{max.})$ = Nominal length (ℓ) − b

$\ell_s(\text{min.}) = \ell_g(\text{max.}) - 5P$

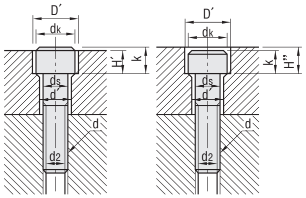
2. L, ℓ_s and ℓ_g of socket head cap screw

Unit: mm

Nominal diameter of thread (d)			M3		M4		M5		M6		M8		M10		M12		(M14)		M16		(M18)		M20		(M22)		M24		(M27)		M30	
L			ℓ_s min and ℓ_g max																													
Nominal length	min	max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max	ℓ_s min	ℓ_g max
5	4.76	5.24																														
6	5.76	6.24																														
8	7.71	8.29																														
10	9.71	10.29																														
12	11.65	12.35																														
16	15.65	16.35																														
20	19.58	20.42																														
25	24.58	25.42	4.5	7																												
30	29.58	30.42	9.5	12	6.5	10	4	8																								
35	34.5	35.5			11.5	15	9	13	6	11																						
40	39.5	40.5			16.5	20	14	18	11	16	5.75	12																				
45	44.5	45.5					19	23	16	21	10.75	17	5.5	13																		
50	49.5	50.5					24	28	21	26	15.75	22	10.5	18																		
55	54.4	55.6							26	31	20.75	27	15.5	23	10.25	19																
60	59.4	60.6							31	36	25.75	32	20.5	28	15.25	24	10	20														
65	64.4	65.6									30.75	37	25.5	33	20.25	29	15	25	11	21	4.5	17										
70	69.4	70.6									35.75	42	30.5	38	25.25	34	20	30	16	26	9.5	22										
80	79.4	80.6									45.75	52	40.5	48	35.25	44	30	40	26	36	19.5	32	15.5	28	11.5	24						
90	89.3	90.7											50.5	58	45.25	54	40	50	36	46	29.5	42	25.5	38	21.5	34	15	30	9	24		
100	99.3	100.7											60.5	68	55.25	64	50	60	46	56	39.5	52	35.5	48	31.5	44	25	40	19	34		
110	109.3	110.7													65.25	74	60	70	56	66	49.5	62	45.5	58	41.5	54	35	50	29	44	20.5	38
120	119.3	120.7													75.25	84	70	80	66	76	59.5	72	55.5	68	51.5	64	45	60	39	54	30.5	48
130	129.2	130.8															80	90	76	86	69.5	82	65.5	78	61.5	74	55	70	49	64	40.5	58
140	139.2	140.8															90	100	86	96	79.5	92	75.5	88	71.5	84	65	80	59	74	50.5	68
150	149.2	150.8																	96	106	89.5	102	85.5	98	81.5	94	75	90	69	84	60.5	78
160	159.2	160.8																	106	116	99.5	112	95.5	108	91.5	104	85	100	79	94	70.5	88
180	179.2	180.8																			119.5	132	115.5	128	111.5	124	105	120	99	114	90.5	108
200	199.05	200.95																					135.5	148	131.5	144	125	140	119	134	110.5	128
220	219.05	220.95																											139	154	130.5	148
240	239.05	240.95																											159	174	150.5	168
260	258.95	261.05																											179	194	170.5	188
280	278.95	281.05																											199	214	190.5	208
300	298.95	301.05																											219	234	210.5	228

Reference: Dimensions of counterboring and bolt hole for the socket head cap screws

Unit: mm



Nominal diameter of thread (d)	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
d_s	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
d′	3.4	4.5	5.5	6.6	9	11	14	16	18	20	22	24	26	30	33
d_k	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
D′	6.5	8	9.5	11	14	17.5	20	23	26	29	32	35	39	43	48
K	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
H′	2.7	3.6	4.6	5.5	7.4	9.2	11	12.8	14.5	16.5	18.5	20.5	22.5	25	28
H”	3.3	4.4	5.4	6.5	8.6	10.8	13	15.2	17.5	19.5	21.5	23.5	25.5	29	32
d_2	2.6	3.4	4.3	5.1	6.9	8.6	10.4	12.2	14.2	15.7	17.7	19.7	21.2	24.2	26.7

TABLE OF DIAMETER OF SCREW LOW HOLE(LOW ANCHOR)

1. Meter coarse thread

Nominal size of thread	Minimum dimensions Grade 2, Grade 3	Maximum dimensions Grade 2	Maximum dimensions Grade 3
M 1×0.25	0.73	0.78	—
M 1.1×0.25	0.83	0.89	—
M 1.2×0.25	0.93	0.98	—
M 1.4×0.3	1.08	1.14	—
M 1.6×0.35	1.22	1.32	—
M 1.7×0.35	1.33	1.42	—
M 1.8×0.35	1.42	1.52	—
M 2×0.4	1.57	1.67	—
M 2.2×0.45	1.71	1.84	—
M 2.3×0.4	1.87	1.97	—
M 2.5×0.45	2.01	2.14	—
M 2.6×0.45	2.12	2.23	—
M 3×0.5	2.46	2.60	2.64
M 3.5×0.6	2.85	3.01	3.05
M 4×0.7	3.24	3.42	3.47
M 4.5×0.75	3.69	3.88	3.92
M 5×0.8	4.13	4.33	4.38
M 6×1	4.92	5.15	5.22
M 7×1	5.92	6.15	6.22
M 8×1.25	6.65	6.91	6.98
M 9×1.25	7.65	7.91	7.98
M 10×1.5	8.38	8.68	8.75
M 11×1.5	9.38	9.68	9.75
M 12×1.75	10.11	10.44	10.53
M 14×2	11.84	12.21	12.31
M 16×2	13.84	14.21	14.31
M 18×2.5	15.29	15.74	15.85
M 20×2.5	17.29	17.74	17.85
M 22×2.5	19.29	19.74	19.85
M 24×3	20.75	21.25	21.38
M 27×3	23.75	24.25	24.38
M 30×3.5	26.21	26.77	26.92
M 33×3.5	29.21	29.77	29.92
M 36×4	31.67	32.27	32.42
M 39×4	34.67	35.27	35.42
M 42×4.5	37.13	37.80	37.98
M 45×4.5	40.13	40.80	40.98
M 48×5	42.59	43.30	43.49

2. Meter fine thread

Nominal size of thread	Minimum dimensions Grade 2, Grade 3	Maximum dimensions Grade 2	Maximum dimensions Grade 3
M 2.5×0.35	2.12	2.22	—
M 3×0.35	2.62	2.72	—
M 3.5×0.35	3.12	3.22	—
M 4×0.5	3.46	3.60	3.64
M 4.5×0.5	3.96	4.10	4.14
M 5×0.5	4.46	4.60	4.64
M 5.5×0.5	4.96	5.10	5.14
M 6×0.75	5.19	5.38	5.42
M 7×0.75	6.19	6.38	6.42
M 8×1	6.92	7.15	7.22
M 8×0.75	7.19	7.38	7.42
M 9×1	7.92	8.15	8.22
M 9×0.75	8.19	8.38	8.42
M 10×1.25	8.65	8.91	8.98
M 10×1	8.92	9.15	9.22
M 10×0.75	9.19	9.38	—
M 11×1	9.92	10.15	10.22
M 11×0.75	10.19	10.38	10.42
M 12×1.5	10.38	10.68	10.75
M 12×1.25	10.65	10.91	10.98
M 12×1	10.92	11.15	11.22
M 14×1.5	12.38	12.68	12.75
M 14×1	12.92	13.15	13.22
M 15×1.5	13.38	13.68	13.75
M 15×1	13.92	14.15	14.22
M 16×1.5	14.38	14.68	14.75
M 16×1	14.92	15.15	15.22
M 17×1.5	15.38	15.68	15.75
M 17×1	15.92	16.15	16.22
M 18×2	15.84	16.21	16.31
M 18×1.5	16.38	16.68	16.75
M 18×1	16.92	17.15	17.22
M 20×2	17.84	18.21	18.31
M 20×1.5	18.38	18.68	18.75
M 20×1	18.92	19.15	19.22
M 22×2	19.84	20.21	20.31
M 22×1.5	20.38	20.68	20.75
M 22×1	20.92	21.15	21.22
M 24×2	21.84	22.21	22.31
M 24×1.5	22.38	22.68	22.75
M 24×1	22.92	23.15	23.22
M 25×2	22.84	23.21	23.31
M 25×1.5	23.38	23.68	23.75
M 25×1	23.92	24.15	24.22
M 26×1.5	24.38	24.68	24.75
M 27×2	24.84	25.21	25.31
M 27×1.5	25.38	25.68	25.75
M 27×1	25.92	26.15	26.22
M 28×2	25.84	26.21	26.31
M 28×1.5	26.38	26.68	26.75
M 28×1	26.92	27.15	27.22
M 30×3	26.75	27.25	27.38
M 30×2	27.84	28.21	28.31
M 30×1.5	28.38	28.68	28.75
M 30×1	28.92	29.15	29.22
M 32×2	29.84	30.21	30.31
M 32×1.5	30.38	30.68	30.75
M 33×3	29.75	30.25	30.38
M 33×2	30.84	31.21	31.31
M 33×1.5	31.38	31.68	31.75
M 35×1.5	33.38	33.68	33.75
M 36×3	32.75	33.25	33.38
M 36×2	33.84	34.21	34.31
M 36×1.5	34.38	34.68	34.75
M 38×1.5	36.38	36.68	36.75
M 39×3	35.75	36.25	36.38
M 39×2	36.84	37.21	37.31
M 39×1.5	37.38	37.68	37.75
M 40×3	36.75	37.25	37.38
M 40×2	37.84	38.21	38.31
M 40×1.5	38.38	38.68	38.75
M 42×4	37.67	38.27	38.42
M 42×3	38.75	39.25	39.38
M 42×2	39.84	40.21	40.31
M 42×1.5	40.38	40.68	40.75
M 45×4	40.67	41.27	41.42
M 45×3	41.75	42.25	42.38
M 45×2	42.84	43.21	43.31
M 45×1.5	43.38	43.68	43.75
M 48×4	43.67	44.27	44.42
M 48×3	44.75	45.25	45.38
M 48×2	45.84	46.21	46.31
M 48×1.5	46.38	46.68	46.75
M 50×3	46.75	47.25	47.38
M 50×2	47.84	48.21	48.31
M 50×1.5	48.38	48.68	48.75

CORRECT TIGHTENING AXIAL FORCE AND CORRECT TIGHTENING TORQUE FOR BOLTS

■The tightening tension and fatigue limit when clamping with bolts

- The calculation of the correct tightening torque is to be within the elastic behavior limit, and a maximum of 70% of the standard yield strength under the Torque Method.
- The fatigue limit from repeated loads on the bolt should not exceed the allowable value.
- The flange of a bolt or nut should not be sunk into the clamped surface.
- The surface to be clamped should not be damaged through the tightening of bolts.

The Torque Method, the Torque Gradient Method, the Turn-of-Nut Method, and the Stretch Measurement Method can all be used as the method of bolt tightening, but the Torque Method is relatively simple and is widely used.

■Calculation of the tightening axial force and tightening torque

The relationship of the tightening axial force Ff is expressed in formula (1).

$F_f = 0.7 \times \sigma_y \times A_s$……(1)

The tightening torque T_{fA}, is expressed in formula (2).

$T_{fA} = 0.35k(1 + 1/Q)\,\sigma_y \cdot A_s \cdot d$……(2)

k : torque coefficient
d : nominal bolt diameter [cm]
Q : tightening coefficient
σ_y : yield strength (112 kgf/mm^2 when strength category is 12.9)
As : effective bolt area [mm^2]

■Calculation Example

The correct torque and axial force is required to clamp two pieces of soft steel (strength category of 12.9) with a socket head cap screw M6 in a lubricated state.

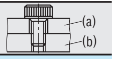
- The correct torque is shown using formula (2)

$$T_{fA} = 0.35k(1 + 1/Q)\,\sigma_y \cdot A_s \cdot d$$
$$= 0.35 \cdot 0.17(1 + 1/1.4)\,112 \cdot 20.1 \cdot 0.6$$
$$= 138\,[\text{kgf} \cdot \text{cm}]$$

- The correct axial tension is shown using formula (1)

$$F_f = 0.7 \times \sigma_y \times A_s$$
$$= 0.7 \times 112 \times 20.1$$
$$= 1576\,[\text{kgf}]$$

■Torque coefficient by combining the surface treatment of the bolt, the surface to be clamped, and the female screw.

Bolt Surface treatment Lubricant	Torque coefficient **k**	Combining Material of surface to be clamped — Material of female screw (**a**) (**b**) 
Steel bolts Black oxide coating Lubricated	0.145	SCM—FC FC—FC SUS—FC
	0.155	S10C—FC SCM—S10C SCM—SCM FCS10C FC—SCM
	0.165	SCM—SUS FC—SUS AL—FC SUS—S10C SUS—SCM SUS—SUS
	0.175	S10C—S10C S10C—SCM S10C—SUS AL—S10C AL—SCM
	0.185	SCM—AL FC—AL AL—SUS
	0.195	S10C—AL SUS—AL
	0.215	AL—AL
Steel bolts Black oxide coating Not lubricated	0.25	S10C—FC SCM—FC FC—FC
	0.35	S10C—SCM SCM—SCM FC—S10 C FC—SCM AL—FC
	0.45	S10C—S10C SCM—S10C AL—S10C AL—SCM
	0.55	SCM—AL FC—AL AL—AL

S10C: Non heat-treated steel SCM:Heat-treated steel (35HRC) FC:Cast iron (FC200) AL:Aluminum SUS:Stainless (SUS304)

■The standard values of tightening coefficient Q

Tightening coefficient Q	Tightening method	Surface state Bolt	Surface state Nut	Lubrication state
1.25	Torque wrench	Manganese phosphate	Non-treated or phosphate	Lubricated or MoS2 paste
1.4	Torque wrench	Non-treated or phosphate		
	Ratchet wrench			
1.6	Impact wrench			
1.8	Torque wrench	Non-treated or phosphate	Non-treated	Not lubricated
	Ratchet wrench			

Expressing strength categories

Example 12.9
Yield strength : 90% of the minimum tensile strength
The minimal tensile strength is 1220N/mm^2 {124kgf/mm^2}

10.9
Yield strength : 90% of the minimum tensile strength
The minimal tensile strength is 1040N/mm^2 {106kgf/mm^2}

■Initial tightening strength and torque

Bolt size	Effective bolt area As mm^2	Strength category 12.9 Yield load kgf	12.9 Initial tightening strength kgf	12.9 Tightening torque kgf・cm	10.9 Yield load kgf	10.9 Initial tightening strength kgf	10.9 Tightening torque kgf・cm	8.8 Yield load kgf	8.8 Initial tightening strength kgf	8.8 Tightening torque kgf・cm	4.8 Yield load kgf	4.8 Initial tightening strength kgf	4.8 Tightening torque kgf・cm
M 3×0.5	5.03	563	394	17	482	338	15	328	230	10	175	122	5
M 4×0.7	8.78	983	688	40	842	589	34	573	401	23	305	213	12
M 5×0.8	14.2	1590	1113	81	1362	953	69	927	649	47	493	345	25
M 6×1	20.1	2251	1576	138	1928	1349	118	1313	919	80	697	488	43
M 8×1.25	36.6	4099	2869	334	3510	2457	286	2390	1673	195	1270	889	104
M10×1.5	58	6496	4547	663	5562	3894	567	3787	2651	386	2013	1409	205
M12×1.75	84.3	9442	6609	1160	8084	5659	990	5505	3853	674	2925	2048	358
M14×2	115	12880	9016	1840	11029	7720	1580	7510	5257	1070	3991	2793	570
M16×2	157	17584	12039	2870	15056	10539	2460	10252	7176	1670	5448	3814	889
M18×2.5	192	21504	15053	3950	18413	12889	3380	12922	9045	2370	6662	4664	1220
M20×2.5	245	27440	19208	5600	23496	16447	4790	16489	11542	3360	8502	5951	1730
M22×2.5	303	33936	23755	7620	29058	20340	6520	20392	14274	4580	10514	7360	2360
M24×3	353	39536	27675	9680	33853	23697	8290	23757	16630	5820	12249	8574	3000

(Notes)
- Tightening conditions : The use of a torque wrench (lubrication, torque coefficient k=0.17, tightening coefficient Q=1.4)
- The torque coefficient changes depending on conditions of use, so please use this table as an indication only.
- This table is an edited except from a catalogue from KYOKUTO MFG.CO., Ltd

〔TECHNICAL DATA〕

STRENGTH OF BOLTS, SCREW PLUGS, AND DOWEL PINS

■Bolt strength

1）When a bolt takes the tensile load

$Pt = \sigma_t \times As$ …… (1)

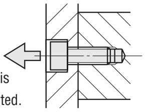
$= \pi d^2 \sigma_t / 4$ …(2)

Pt ：Axial tensile load [kgf]
σ_b ：the bolts yield stress [kgf/mm^2]
σ_t ：the bolts allowable stress [kgf/mm^2]
（$\sigma_t = \sigma_b$/safety factor α）
As ： Effective bolt area [mm^2]
$As = \pi d^2/4$
d ：Bolts effective diameter (shaft diameter) [mm]

（Example） The correct size is required for a socket head cap screw to take a repeat load（pulsating）with P= 200 kgf.
（The materials of a socket head cap screw are: SCM435, 38～43HRC, strength category of 12.9.）

Using formula（1）

$As = Pt/\sigma_t$
$= 200/22.4$
$= 8.9$ [mm^2]



∴ The bolt with an effective area larger than this is required, and a 14.2 [mm^2] M5 would be selected. Although, if we take into consideration the endurance strength, looking at the strength category of 12.9, we would choice the M6 with an allowable load of 213kgf.

2） For stripper bolts which recieve the impact load, the size is decided by the fatigue strength.（Likewise for a load of 200kgf, the stripper bolt would be SCM435, 33～38HRC, with a strength category of 10.9.）

In the table to the right, the allowable load for a load over 200kgf for a strength category of 10.9 is as M8 at 318（kgf）. Therefore, the MSB10 would be selected, with a screw diameter of 10mm like the M8. Please use dowel pins also to take the shearing load.

■Unwin safety factor α based on tensile strength

Material	Static load	Repeated load		Impact load
		Pulsating	Reversed	
Steel	3	5	8	12
Cast iron	4	6	10	15
Copper, soft metals	5	5	9	15

$\text{Allowable stress} = \frac{\text{Standard strength}}{\text{Safety factor } \alpha}$ Standard strength：The yield strength for ductile materials
The breaking stress for brittle materials

The yield stress for a strength category of 12.9 is $\sigma_b = 112$ [kgf/mm^2]
The allowable stress $\sigma_t = \sigma_b$/safety factor (safety factor of 5 from the above table)
$= 112/5$
$= 22.4$ [kgf/mm^2]

■The bolt endurance strength（For screws, the endurance strength is 2 million times use.）

Bolt size	Effective bolt area As mm^2	Strength category 12.9 Fatigue strength* kgf／mm^2	12.9 Allowable load kgf	10.9 Fatigue strength* kgf／mm^2	10.9 Allowable load kgf
M 4	8.78	13.1	114	9.1	79
M 5	14.2	11.3	160	7.8	111
M 6	20.1	10.6	213	7.4	149
M 8	36.6	8.9	326	8.7	318
M10	58	7.4	429	7.3	423
M12	84.3	6.7	565	6.5	548
M14	115	6.1	702	6	690
M16	157	5.8	911	5.7	895
M20	245	5.2	1274	5.1	1250
M24	353	4.7	1659	4.7	1659

Fatigue strength* is an edited excerpt taken from “the measured values of the endurance limit for small screws, bolts, and meter screws for nuts”（Yamamoto）.

■Screw plug strength

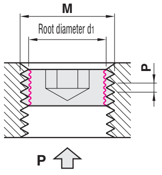
Allowable load P is required for screw plug MSW30 to recieve an impact load.（The MSW30：S45C, the tensile strength σ_b of 34～43HRC is 65kgf / mm^2）.

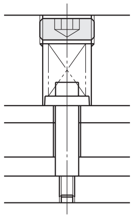
When the root diameter section of the MSW is ruptured due to shearing strain,

the allowance load $P = \tau_t \times A$
$= 3.9 \times 1074$
$= 4188.6$ [kgf]

When the tap is made of soft material, an allowable shear is required from the root diameter of the female screw.

Shear area A=root diameter $d_1 \times \pi \times L$
(root diameter $d_1 ≒ M - P$)
$A = (M-P)\pi L = (30-1.5)\pi \times 12$
$= 1074$ [mm^2]
Yield stress ≒ 0.9 × tensile strength $\sigma_b = 0.9 \times 65 = 58.2$
Shear stress ≒ 0.8 × yield stress
$= 46.6$
Allowable shear stress τ_t = shear stress/safety factor 12
$= 46.6/12 = 3.9$ [kgf/mm^2]





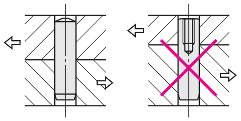
■Dowel pin strength

The correct size for a dowel pin is required in order for it to hold repeated shear load（pulsating）of 800kfg.（Material of the dowel pin is SUJ2, hardness of 58HRC～.）

$P = A \times \tau$
$= \pi D^2 \tau / 4$
$D = \sqrt{(4P)/(\pi \tau)}$
$= \sqrt{(4 \times 800)/(3.14 \times 19.2)}$
$≒ 7.3$

The applicable yield stress of SUJ2 $\sigma_b = 120$ [kgf/mm^2]
Allowable shear strength $\tau = \sigma_b \times 0.8$/safety factor α
$= 120 \times 0.8/5$
$= 19.2$ [kgf/mm^2]

∴ A size of D8 or more is selected for a MS dowel pin.
Also, the tools and stock etc can be reduced if the size of the dowel pin is consistently large.



Use dowel pins so that screw parts have no loading.

Everything noted here are only examples of strengths. In actual practice, the hole pitch precision, the perpendicular angle of the hole, surface coarseness, circularity, the plate materials, parallelism, whether its tempered or not, the precision of the injection molding machine, production quantity, tool wear, etc must be taken into consideration. Therefore these values should only be used as a guide.（These are not guaranteed figures.）

〔TECHNICAL DATA〕

COMPARISON OF DIE STEEL BY MANUFACTURERS
HARDNESS OF MAJOR STEEL PRODUCTS AND CORRESPONDING TOOLS

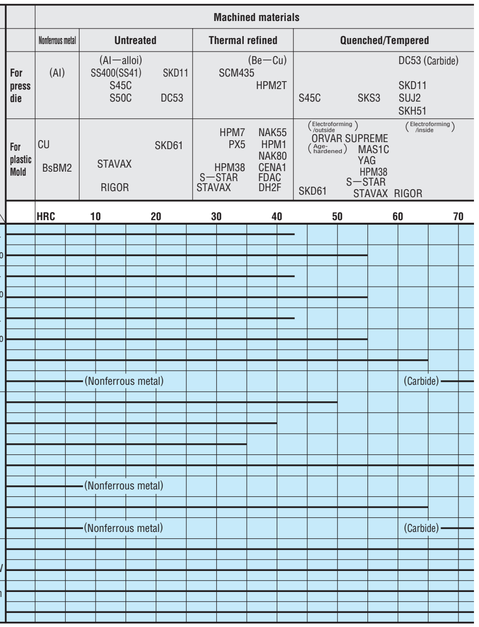
Comparison of die steel by manufacturers

Classification	Steel types related to the foreign standards JIS	AISI	DIN	Hardness in use HRC	Hitachi Metals, Ltd.	Daido Steel Co., Ltd.	Uddeholm	Kobe Steel Co., Ltd.	Aichi Steel Works, Ltd.	Nippon Koshuha Steel Co., Ltd.	Sanyo Special Steel Co., Ltd.	NACHI
Pre hardened steel	SC group			13			UHB11	KTSM2A	AUK1	KPM1	PC55	
								KTSM21				
	SCM440 group			28				KTSM3A	AUK11	KPM2	PCM28	
								KTSM31				
	SCM（revised）	P20 group		33	HPM7		HOLDAX	KTSM3M		KPM25		
						PX5	IMPAX			KPM30		
				40	（HPM2T）	GŌ40F	NIMAX					
	SUS group			33	HPM38	S-STAR	STAVAX			KSP1	QPD5	PROVA400
	SUS group（free cutting） *Includes free cutting components			33	HPM77	G-STAR	RAMAX RoyAlloy					
	SUS group			35	PSL	NAK101	CORRAX			U630	QSH6	
	SKD61 group（free cutting） *Includes free cutting components	H13 group	X40CrMoV51	40	FDAC	DH2F		KTSM41		KDA	QD6F	
	Precipitation hardened steel group (free cutting) *Includes free cutting components	P21 group		40	HPM1	NAK55		KTSM40EF		KAP		
	Precipitation hardened steel group	P21		40	CENA1 （HPM50）	NAK80		KTSM40E		KAP2	PCM40	
Quench-and-temper steel	SKS93			55～62	YCS3	YK30			SK301	K3M	QK3M	SK3M
	SKS3			55～62	SGT	GOA	ARNE		SKS3	KS3	QKS3	SKS3
	SKD61	H13	X40CrMoV51	50	DAC	DHA1	ORVAR		SKD61	KDA	QD61	HDS61
	SKD1	D3	X210Cr12	58	CRD	DC1	SVERKER3		SKD1	KD1	QC1	CDS1
	SKD11	D2		58	SLD	DC11			SKD11	KD11S	QC11	CDS11
	SKD11（revised） *8 Cr series	D2 group		60	（SLD8） HPM31	DC53 PD613	SLEIPNER	KAD181	AUD15	KD21	QCM8	MCR12
	SKD12	A2		58		DC12	RIGOR		SKD12	KD12	QC12	CDS12
	SKH51	M2	S6-5-2	60	YXM1	MH51				H51	QH51	SKH9
	SUS group			57	SUS440C		ELMAX	KAS440 （powder）		KSP2 KSP3	QCD5 SPC5（powder）	FAXR2
	SUS group			52	HPM38 HPM38S	S-STAR	STAVAX			KSP1	QPD1 QPD5	PROVA400
Aging-treated steel	Maraging steel			53	YAG	MAS1C				KMS18-20	QM300	
	Non-magnetic steel			43	HPM75							

*CENA1 is an updated steel for HPM50.

Processing method		Equipment	Required tools
Cutting	Boring on flanks and bottom	General purpose milling cutter NC milling cutter Machining center	Drills Reamers End mills Cutting tools
	Boring	Drilling machine Drill press Boring machine Jig borer	Drills Taps Reamers Cutting tools
	Machining cylinders	General purpose lathe NC lathe Turning center	Drills Reamers Taps Cutting tools
Grinding		Surface grinder Cylindrical grinder Jig grinder Profile grinder Forming grinder	Magnets grindstone
Electroerosion		E D M	Electrode master
		W E D M	Wire

Tools	Materials Parts materials Tools materials	
Drills Reamers	High-speed steel	SKH—
	Cemented carbide	Wn—Co
Taps	High-speed steel	SKH—
	Cemented carbide	Wn—Co
End mils	High-speed steel	SKH—
	Cemented carbide	Wn—Co
Cutting tools	Boron	CBN
	Diamond	D
Magnets grindstone	White fused alumina	WA
	Brown fused alumina	A
	Pink fused almina	PA
	Green silicon carbide	GC
	Black silicon carbide	C
	Electrodeposited boron	CBN
	Electrodeposited diamond	D
Electrode master	Electrolytic copper Brass Copper tungsten Silver tungsten	Cu— —W
Wire	Brass	Cu—Zn
	Tungsten	W



COMPARISON OF MATERIALS BETWEEN JIS AND FOREIGN STANDARDS(1)

Stainless steels・Heat resisting steels and related materials

Japan Industrial Standards		Steel Type Related to Foreign Standards					
Standard Number Name	Code	ISO 683/1,10,11 5)	AISI SAE	BS 970 Part1,3 BS EN 10083—1,2	DIN EN 10084 DIN EN 10083—1,2	NF A35—551 NF EN 10083—1,2	ГOCT 4543
JIS G 4051 Carbon steel for machine structual use	S10C	C10	1010	040A10 045A10 045M10	C10E C10R	XC10	—
	S12C	—	1012	040A12	—	XC12	—
	S15C	C15E4 C15M2	1015	055M15	C15E C15R	—	—
	S17C	—	1017	—	—	XC18	—
	S20C	—	1020	070M20 C22 C22E C22R	C22 C22E C22R	C22 C22E C22R	—
	S22C	—	1023	—	—	—	—
	S25C	C25 C25E4 C25M2	1025	C25 C25E C25R	C25 C25E C25R	C25 C25E C25R	—
	S28C	—	1029	—	—	—	25Г
	S30C	C30 C30E4 C30M2	1030	080A30 080M30 C30 C30E C30R	C30 C30E C30R	C30 C30E C30R	30Г
	S33C	—	—	—	—	—	30Г
	S35C	C35 C35E4 C35M2	1035	C35 C35E C35R	C35 C35E C35R	C35 C35E C35R	35Г
	S38C	—	1038	—	—	—	35Г
	S40C	C40 C40E4 C40M2	1039 1040	080M40 C40 C40E C40R	C40 C40E C40R	C40 C40E C40R	40Г
	S43C	—	1042 1043	080A42	—	—	40Г
	S45C	C45 C45E4 C45M2	1045 1046	C45 C45E C45R	C45 C45E C45R	C45 C45E C45R	45Г
	S48C	—	—	080A47	—	—	45Г
	S50C	C50 C50E4 C50M2	1049	080M50 C50 C50E C50R	C50 C50E C50R	C50 C50E C50R	50Г
	S53C	—	1050 1053	—	—	—	50Г
	S55C	C55 C55E4 C55M2	1055	070M55 C55 C55E C55R	C55 C55E C55R	C55 C55E C55R	—
	S58C	C60 C60E4 C60M2	1059 1060	C60 C60E C60R	C60 C60E C60R	C60 C60E C60R	60Г
	S09CK	—	—	045A10 045M10	C10E	XC10	—
	S15CK	—	—	—	C15E	XC12	—
	S20CK	—	—	—	—	XC18	—

ISO：International Organization for Standardization
AISI：American Iron and Steel Institute
SAE：Society of Automotive Engineers
BS：British Standards

Japan Industrial Standards		Steel Types Related to Foreign Standards					
Standard Number Name	Code	ISO 683/1,10,11 5)	AISI SAE	BS 970 Part1,3 BS EN 10083—1,2	DIN EN 10084 DIN EN 10083—1,2	NF A35—551 NF EN 10083—1,2	ГOCT 4543
JIS G 4102 Nickel-chrome steel	SNC236	—	—	—	—	—	40XH
	SNC415	—	—	—	—	—	—
	SNC631	—	—	—	—	—	30XH3A
	SNC815	15NiCr13	—	655M13	15NiCr13	—	—
	SNC836	—	—	—	—	—	—
JIS G 4103 Nickel-chrome molybdenum steel	SNCM220	20NiCrMo2 20NiCrMoS2	8615 8617 8620 8622	805A20 805M20 805A22 805M22	20NiCrMo2 20NiCrMoS2	20NCD2	—
	SNCM240	41CrNiMo2 41CrNiMoS2	8637 8640	—	—	—	—
	SNCM415	—	—	—	—	—	—
	SNCM420	—	4320	—	—	—	20XH2M(20XHM)
	SNCM431	—	—	—	—	—	—
	SNCM439	—	4340	—	—	—	—
	SNCM447	—	—	—	—	—	—
	SNCM616	—	—	—	—	—	—
	SNCM625	—	—	—	—	—	—
	SNCM630	—	—	—	—	—	—
	SNCM815	—	—	—	—	—	—
JIS G 4104 Chrome steel	SCr415	—	—	—	17Cr3 17CrS3	—	15X 15XA
	SCr420	20Cr4 20CrS4	5120	—	—	—	20X
	SCr430	34Cr4 34CrS4	5130 5132	34Cr4 34CrS4	34Cr4 34CrS4	34Cr4 34CrS4	30X
	SCr435	34Cr4 34CrS4 37Cr4 37CrS4	5132	37Cr4 37CrS4	37Cr4 37CrS4	37Cr4 37CrS4	35X
	SCr440	37Cr4 37CrS4 41Cr4 41CrS4	5140	530M40 41Cr4 41CrS4	41Cr4 41CrS4	41Cr4 41CrS4	40X
	SCr445	—	—	—	—	—	45X
JIS G 4105 Chrome molybdenum steel	SCM415	—	—	—	—	—	—
	SCM418	18CrMo4 18CrMoS4	—	—	18CrMo4 18CrMoS4	—	20XM
	SCM420	—	—	708M20	—	—	20XM
	SCM421	—	—	—	—	—	—
	SCM430	—	4131	—	—	—	30XM 30XMA
	SCM432	—	—	—	—	—	—
	SCM435	34CrMo4 34CrMoS4	4137	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	35XM
	SCM440	42CrMo4 42CrMoS4	4140 4142	708M40 709M40 42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	—
	SCM445	—	4145 4147	—	—	—	—
	SCM822	—	—	—	—	—	—

DIN：Deutsches Institut für Nörmung
EN：European Standards
NF：Norme Francaise
ГOCT：National standard of the former USSR

Japan Industrial Standards		Steel Types Related to Foreign Standards					
Standard Number Name	Code	ISO 683/1,10,11 5)	AISI SAE	BS 970 Part1,3 BS EN 10083—1,2	DIN EN 10084 DIN EN 10083—1,2	NF A35—551 NF EN 10083—1,2	ГOCT 4543
JIS G 4106 Structual manganese steel for machine Structual use and manganese chrome steel	SMn420	22Mn6	1522	150M19	—	—	—
	SMn433	—	1534	150M36	—	—	30Г2 35Г2
	SMn438	36Mn6	1541	150M36	—	—	35Г2 40Г2
	SMn443	42Mn6	1541	—	—	—	40Г2 45Г2
	SMnC420	—	—	—	—	—	—
	SMnC443	—	—	—	—	—	—
JIS G 4202 Aluminum chrome molybdenum steel	SACM645	41CrAIMo74	—	—	—	—	—
JIS G 4052 Structual steel with guaranteed hardenability （H steel）	SMn420H	22Mn6	1522H	—	—	—	—
	SMn433H	—	—	—	—	—	—
	SMn438H	36Mn6	1541H	—	—	—	—
	SMn443H	42Mn6	1541H	—	—	—	—
	SMnC420H	—	—	—	—	—	—
	SMnC443H	—	—	—	—	—	—
	SCr415H	—	—	—	17Cr3 17CrS3	—	15X
	SCr420H	20Cr4 20CrS4	5120H	—	—	—	20X
	SCr430H	34Cr4 34CrS4	5130H 5132H	34Cr4 34CrS4	34Cr4 34CrS4	34Cr4 34CrS4	30X
	SCr435H	34Cr4 34CrS4 37Cr4 37CrS4	5135H	37Cr4 37CrS4	37Cr4 37CrS4	37Cr4 37CrS4	35X
	SCr440H	37Cr4 37CrS4 41Cr4 41CrS4	5140H	41Cr4 41CrS4	41Cr4 41CrS4	41Cr4 41CrS4	40X
	SCM415H	—	—	—	—	—	—
	SCM418H	18CrMo4 18CrMoS4	—	—	18CrMo4 18CrMoS4	—	—
	SCM420H	—	—	708H20	—	—	—
	SCM435H	34CrMo4 34CrMoS4	4135H 4137H	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	—
	SCM440H	42CrMo4 42CrMoS4	4140H 4142H	42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	—
	SCM445H	—	4145H 4147H	—	—	—	—
	SCM822H	—	—	—	—	—	—
	SNC415H	—	—	—	—	—	—
	SNC631H	—	—	—	—	—	—
	SNC815H	15NiCr13	—	655H13	15NiCr13	—	—
	SNCM220H	20NiCrMo2 20NiCrMoS2	8617H 8620H 8622H	805H17 805H20 805H22	—	20NCD2	—
	SNCM420H	—	4320H	—	—	—	—

Japan Industrial Standards		Steel Types Related to Foreign Standards					
Standard Number Name	Code	ISO 683/1,10,11 5)	AISI SAE	BS 970 Part1,3 BS EN 10083—1,2	DIN EN 10084 DIN EN 10083—1,2	NF A35—551 NF EN 10083—1,2	ГOCT 4543
JIS G 4107 High-temperature alloy steel for bolts	SNB5	—	501	—	—	—	—
	SNB7	42CrMo4 42CrMoS4	4140 4142 4145	708M40 709M40 42CrMo4 1)	42CrMo4 2)	42CrMo4 4)	—
	SNB16	—	—	40CrMoV4—6 1)	40CrMoV47 3)	40CrMoV4—6 4)	—
JIS G 4108 Steel bar for special-purpose alloy steel bolt	SNB21—1～5	—	—	40CrMoV4—6 1)	40CrMoV47 3)	40CrMoV4—6 4)	—
	SNB22—1～5	42CrMo4 42CrMoS4	4142H	—	42CrMo4 2)	—	—
	SNB23—1～5	—	E4340H	—	—	—	—
	SNB24—1～5	—	4340	—	—	—	—

Note：
1) BS EN 10259
2) DIN 1654 Part 4
3) DIN 17240
4) NF EN 10259
5) ISO683-1,10,11 have been issued as JIS G 7501, G7502, G 7503 by Translation JIS.

Names of tool steel

Rolled steel for general structures	SS400	……Steel・Structure・400N/mm²
Carbon steel for machinery structures	S45C	……Steel・0.45%C
Chrome molybdenum steel	SCM435	……Steel・Cr・Mo 435
Nickel chrome molybdenum steel	SNCM220	……Steel・Ni・Cr・Mo 220
Carbon tool steel	SK105 (Old SK3)	……Steel・Kogu (Tool)・105 types
Alloy tool steel	SKS3	……Steel・Kogu (Tool)・Special・3 types
〃	SKD11	……Steel・Kogu (Tool)・Dies・11 types
High speed tool steel	SKH51	……Steel・Kogu (Tool)・High Speed・51 types
High carbon chrome bearing steel	SUJ2	……Steel・Use・Jikuuke (Bearing)・2 types
Stainless steel	SUS304	……Steel・Use・Stainless・304 types
Gray iron	FC250	……Ferrum (Iron)・Cast・250N/mm²

COMPARISON OF MATERIALS BETWEEN JIS AND FOREIGN STANDARDS(2)

Carbon steels for machine structual use・Alloy steel and related materials

Japan Industrial Standards		International Standards	Foreign Standards						European Standards EN	
			United States		UK	Germany	France	Russia		
Standard number /name (stainless steel abbreviation)	JIS	ISO TR 15510 L-No.	UNS	AISI	BS	DIN	NF	ГOCT	Type	Number
JIS G 4303～	SUS 201	12	S20100	201			Z12CMN17-07Az		X12CrMnNiN17-7-5	1.4372
4305	SUS 202		S20200	202	284S16			12X17Г9AH4	X12CrMnNiN18-9-5	1.4373
Rods	SUS 301	5	S30100	301	301S21	X12CrNi17 7	Z11CN17-08	07X16H6	X5CrNi17-7	1.4319
Ⅰ*	SUS 301L	4				X2CrNiN18-7			X2CrNiN18-7	1.4318
Ⅱ*	SUS 301J1					X12CrNi17 7				
JIS G 4308～	SUS 302		S30200	302	302S25		Z12CN18-09	12X18H9		
4309	SUS 302B		S30215	302B						
Wire	SUS 303	13	S30300	303	303S21	X10CrNiS18 9	Z8CNF18-09		X8CrNiS18-9	1.4305
Cable	SUS 303Se		S30323	303Se	303S41			12X18H10E		
	SUS 303Cu									
JIS G 4313～	SUS 304	6	S30400	304	304S31	X5CrNi18 10	Z7CN18-09	08X18H10	X4CrNi18-10	1.4301
4315	SUS 304L	1	S30403	304L	304S11	X2CrNi19 11	Z3CN19-11	03X18H11	X2CrNi19-11	1.4307
		2								1.4307
Spring strips	SUS 304N1	10	S30451	304N			Z6CN19-09Az		X2CrNi18-9	1.4306
Spring wire	SUS 304N2		S30452							
Cold pressed wire	SUS 304LN	3	S30453	304LN		X2CrNiN18 10	Z3CN18-10Az		X2CrNiN18-10	1.4311
JIS G 4317～	SUS 304J1									
4320	SUS 304J2									
Ⅲ*	SUS 304J3		S30431	S30431						
Ⅳ*	SUS 305	8	S30500	305	305S19	X5CrNi18 12	Z8CN18-12	06X18H11	X4CrNi18-12	1.4303
Ⅴ*	SUS 305J1									
Ⅵ*	SUS 309S	X6CrNi23-14	S30908	309S			Z10CN24-13			
	SUS 310S	X6CrNi25-21	S31008	310S	310S31		Z8CN25-20	10X23H18	X6CrNi25-20	
	SUS 315J1									
	SUS 315J2									
	SUS 316	26	S31600	316	316S31	X5CrNiMo17 12 2	Z7CND17-12-02		X4CrNiMo17-12-2	1.4401
	SUS 316F	27				X5CrNiMo17 13 3	Z6CND18-12-03		X4CrNiMo17-13-3	1.4436
	SUS 316L	19	S31603	316L	316S11	X2CrNiMo17 13 2	Z3CND17-12-02		X2CrNiMo17-12-2	1.4404
		20				X2CrNiMo17 14 3	Z3CND17-13-03	03X17H14M3	X2CrNiMo17-13-3	1.4432
									X2CrNiMo18-14-3	1.4435
	SUS 316N		S31651	316N						
	SUS 316LN	22	S31653	316LN		X2CrNiMoN17 12 2	Z3CND17-11Az		X2CrNiMoN17-11-2	1.4406
		23				X2CrNiMoN17 13 3	Z3CND17-12Az		X2CrNiMoN17-13-3	1.4429
	SUS 316Ti	28	S31635			X6CrNiMoTi17 12 2	Z6CNDT17-12	08X17H13M2T	X6CrNiMoTi17-12-2	1.4571
	SUS 316J1									
	SUS 316J1L									
	SUS 317		S31700	317	317S16					
	SUS 317L	21	S31703	317L	317S12	X2CrNiMo18 16 4	Z3CND19-15-04		X2CrNiMo18-15-4	1.4438
	SUS 317LN	24	S31753				Z3CND19-14Az		X2CrNiMoN18-12-4	1.4434
	SUS 317J1								X2CrNiMoN17-13-5	1.4439
	SUS 317J2									
	SUS 317J3L									
	SUS 836L		N08367							
	SUS 890L	31	N08904	N08904	904S14		Z2NCDU25-20		X1CrNiMoCuN25-25-5	1.4539
	SUS 321	15	S32100	321	321S31	X6CrNiTi18 10	Z6CNT18-10	08X18H10T	X6CrNiTi18 10	1.4541
	SUS 347	17	S34700	347	347S31	X6CrNiNb18 10	Z6CNNb18-10	08X18H12Б	X6CrNiNb18 10	1.4550
	SUS 384	9	S38400	384			Z6CN18-16			
	SUS XM7	D26(1)	S30430	304Cu	394S17		Z2CNU18-10		X3CrNiCu18-9-4	1.4587
	SUS XM15J1		S38100				Z15CNS20-12		X1CrNiSi18-15-4	1.4381
	SUS 329J1		S32900	329						
	SUS 329J3L	33	S39240	S31803			Z3CNDU22-05Az	08X21H6M2T	X2CrNiMoN22-5-3	1.4462
	SUS 329J4L	34	S39275	S31260			Z3CNDU25-07Az		X2CrNiMoCuN25-6-3	1.4507

* Ⅰ: Hot-rolled sheets and strips, Ⅱ: Cold-rolled sheets and strips, Ⅲ: Hot-rolled equal angle steel, Ⅳ: Cold-rolled rods,
Ⅴ: Steel fragments of cast objects, Ⅵ: Cold-rolled equal angle steel, Ⅶ: Heat resisting steel bar, Ⅷ: Heat resisting steel plate

Japan Industrial Standards		International Standards	Foreign Standards						European Standards EN	
			United States		UK	Germany	France	Russia		
Standard number /name (stainless steel abbreviation)	JIS	ISO TR 15510 L・No.	UNS	AISI	BS	DIN	NF	ГOCT	Type	Number
	SUS 405	40	S40500	405	405S17	X6CrAl13	Z8CA12		X6CrAl13	1.4002
	SUS 410L						Z3C14			
	SUS 429		S42900	429						
	SUS 430	41	S43000	430	430S17	X6Cr17	Z8C17	12X17	X6Cr17	1.4016
	SUS 430F	42	S43020	430F		X7CrMoS18	Z8CF17		X6CrMoS17	1.4105
	SUS 430LX	44	S43035			X6CrTi17	Z4CT17		X3CrTi17	1.4510
						X6CrNb17			X2CrTi17	1.4520
	SUS 430J1L						Z4CNb17		X3CrNb17	1.4511
	SUS 434	43	S43400	434	434S17	X6CrMo17 1	Z8CD17-01		X6CrMo17-1	1.4113
	SUS 436L		S43600	436					X1CrMoTi16-1	1.4513
	SUS 436J1L									
	SUS 444	46	S44400	444			Z3CDT18-02		X2CrMoTi18-2	1.4521
	SUS 445J1									
	SUS 445J2									
	SUS 447J1		S44700							
	SUS XM27		S44627				Z1CD26-01			
	SUS 403		S40300	403						
	SUS 410	48	S41000	410	410S21	X10Cr13	Z13C13		X12Cr13	1.4006
	SUS 410S	39	S41008	410S	403S17	X6Cr13	Z8C12	08X13	X6Cr13	1.4000
	SUS 410F2									
	SUS 410J1		S41025							
	SUS 416	49	S41600	416	416S21		Z11CF13		X12CrS13	1.4005
	SUS 420J1	50	S42000	420	420S29	X20Cr13	Z20C13	20X13	X20Cr13	1.4021
	SUS 420J2	51	S42000	420	420S37	X30Cr13	Z33C13	30X13	X30Cr13	1.4028
	SUS 420F		S42020	420F			Z30CF13		X29CrS13	1.4029
	SUS 420F2									
	SUS 429J1									
	SUS 431	57	S43100	431	431S29	X20CrNi17 2	Z15CN16-02	20X17H2	X19CrNi17 2	1.4057
	SUS 440A		S44002	440A			Z70C15		X70CrMo15	1.4109
	SUS 440B		S44003	440B						
	SUS 440C		S44004	440C			Z100CD17	95X18	X105CrMo17	1.4125
	SUS 440F		S44020	S44020						
	SUS 630	58	S17400	S17400			Z6CNU17-04		X5CrNiCuNb16-4	1.4542
	SUS 631	59	S17700	S17700		X7CrNiAl17 7	Z9CNA17-07	09X17H7 IO	X7CrNiAl17-7	1.4568
	SUS 632J1									
JIS G 4311～	SUH 31				331S42		Z35CNWS14-14	45X14H14B2M		
4315	SUH 35	X53CrMnNi21 4 (2)			349S52		Z52CMN21-09Az			
Ⅶ*										
Ⅷ*	SUH 36		S63008		349S54	X53CrMnNi21 9	Z55CMN21-09Az	55X20Г9AH4		
	SUH 37		S63017		381S34					
	SUH 38									
	SUH 309		S30900	309	309S24		Z15CN24-13			
	SUH 310		S31000	310	310S24	CrNi2520	Z15CN25-20	20X25H20C2		
	SUH 330		N08330	N08330			Z12NCS35-16			
	SUH 660		S66286				Z6NCTV25-20			
	SUH 661		R30155							
	SUH 21					CrAl1205				
	SUH 409	37	S40900	409	409S19	X6CrTi12	Z6CT12			
	SUH 409L	36					Z3CT12		X2CrTi12	1.4512
	SUH 446	X15CrN26(2)	S44600	446			Z12C25	15X28		
	SUH 1	X45CrSi9-3(2)	S65007		401S45	X45CrSi9 3	Z45CS9			
	SUH 3						Z40CSD10	40X10C2M		
	SUH 4				443S65		Z80CSN20-02			
	SUH 11	X50CrSi18-2(2)						40X 9C2		
	SUH 600							20X12BHMБϕГ		
	SUH 616		S42200							

Notes：
1.ISO is according to ISO TR 15510:1997. The notation is the same as for the English. However, (1) is based on ISO 4954 and (2) is based on ISO683・15.
2.We referred to the UNS registration numbers and AISI material manual for American data.
3.European standards are based upon EN10088-1:1995.
4.We referred to standards of the individual countries in Europe, BS, DIN, and NF, but the standards will be abolished do to the EN regulations.
5.ГOCT is based on 5632.

Tool steels and related materials

Japan Industrial Standard		Steel types related to foreign standards					
Standard number Name	Code	ISO	AISI ASTM	BS	DIN VDEh	NF	ГOCT
JIS G 4401 Carbon tool steel	SK140 (Old SK1)	TC140	—	—	—	C140E3U	Y13
	SK120 (Old SK2)	TC120	W1—11½	—	—	C120E3U	Y12
	SK105 (Old SK3)	TC105	W1—10	—	C105W1	C105E2U	Y11
	SK95 (Old SK4)	TC 90	W1— 9	—	—	C 90E2U	Y10
	SK85 (Old SK5)	TC 90 TC 80	W1— 8	—	C 80W1	C 90E2U C 80E2U	Y8Г Y9
	SK75 (Old SK6)	TC 80 TC 70	—	—	C 80W1	C 80E2U C 70E2U	Y8
	SK65 (Old SK7)	—	—	—	C 70W2	C 70E2U	Y7
JIS G 4403 High-speed tool steel	SKH 2	HS18—0—1	T 1	BT 1	—	HS18—0—1	P18
	SKH 3	HS18—1—1—5	T 4	BT 4	S18—1—2—5	HS18—1—1—5	—
	SKH 4	HS18—0—1—10	T 5	BT 5	—	HS18—0—2—9	—
	SKH10	HS12—1—5—5	T15	BT15	S12—1—4—5	HS12—1—5—5	—
	SKH51	HS 6—5—2	M2	BM 2	S 6—5—2	HS 6—5—2	—
	SKH52	—	M3—1	—	—	—	—
	SKH53	HS 6—5—3	M3—2	—	S 6—5—3	HS 6—5—3	—
	SKH54	—	M4	BM 4	—	HS 6—5—4	—
	SKH55	HS 6—5—2—5	—	BM35	S 6—5—2—5	HS 6—5—2—5HC	P6M5K5
	SKH56	—	M36	—	—	—	—
	SKH57	HS10—4—3—10	—	BT42	S10—4—3—10	HS10—4—3—10	—
	SKH58	HS 2—9—2	M7	—	—	HS 2—9—2	—
	SKH59	HS 2—9—1—8	M42	BM42	S 2—10—1—8	HS 2—9—1—8	—
JIS G 4404 Alloy tool steel	SKS11	—	F2	—	—	—	XB4
	SKS 2	105WCr1	—	—	105WCr6	105WCr5	XBГ
	SKS21	—	—	—	—	—	—
	SKS 5	—	—	—	—	—	—
	SKS51	—	L6	—	—	—	—
	SKS 7	—	—	—	—	—	—
	SKS 8	—	—	—	—	C140E3UCr4	13X
	SKS 4	—	—	—	—	—	—
	SKS41	—	—	—	—	—	—
	SKS43	TCV105	W2—9½	BW2	—	100V2	—
	SKS44	—	W2—8	—	—	—	—
	SKS 3	—	—	—	—	—	9XBГ
	SKS31	105WCr1	—	—	105WCr6	105WCr5	XBГ
	SKS93	—	—	—	—	—	—
	SKS94	—	—	—	—	—	—
	SKS95	—	—	—	—	—	—
	SKD 1	210Cr12	D3	BD3	X210Cr12	X200Cr12	X12
	SKD11	—	D2	BD2	—	X160CrMoV12	—
	SKD12	100CrMoV5	A2	BA2	—	X100CrMoV5	—
	SKD 4	30WCrV5	—	—	—	X32WCrV3	—
	SKD 5	30WCrV9	H21	BH21	—	X30WCrV9	—
	SKD 6	—	H11	BH11	X38CrMoV51	X38CrMoV5	4X5MϕC
	SKD61	40CrMoV5	H13	BH13	X40CrMoV51	X40CrMoV5	4X5Mϕ1C
	SKD62	—	H12	BH12	—	X35CrWMoV5	3X3M3ϕ

Japan Industrial Standard		Steel types related to foreign standards					
Standard number Name	Code	ISO	AISI ASTM	BS	DIN VDEh	NF	ГOCT
JIS G 4404 (Continued)	SKD 7	30CrMoV3	H10	BH10	X32CrMoV33	32CrMoV12—18	—
	SKD 8	—	H19	BH19	—	—	—
	SKT 3	—	—	—	—	55CrNiMoV4	—
	SKT 4	55NiCrMoV2	—	BH224/5	55NiCrMoV6	55NiCrMoV7	5XHM

Special purpose steels

Japan Industrial Standard		Steel types related to foreign standards					
Standard number Name	Code	ISO	AISI SAE	BS	DIN	NF	ГOCT
JIS G 4801 Spring steel	SUP 3	—	1075 1078	—	—	—	75 80 85
	SUP 6	59Si7	—		—	60Si7	60C2
	SUP 7	59Si7	9260	—	—	60Si7	60C2Г
	SUP 9	55Cr3	5155	—	55Cr3	55Cr3	—
	SUP 9A	—	5160	—	—	60Cr3	—
	SUP10	51CrV4	6150	—	50CrV4	51CrV4	XϕA50XГϕA
	SUP11A	60CrB3	51B60	735A51,735H51	—	—	50XГP
	SUP12	55SiCr63	9254	—	54SiCr6	54SiCr6	—
	SUP13	60CrMo33	4161	685A57,685H57	—	60CrMo4	—
JIS G 4804 Sulfur and sulfur combined free cutting steel	SUM11	—	1110	705A60,705H60	—	—	—
	SUM12	—	1108	—	—	—	—
	SUM21	9 S20	1212	—	—	—	—
	SUM22	11SMn28	1213	—	9 SMn28	S250	—
	SUM22L	11SMnPb28	12L13	(230M07)	9 SMnPb28	S250Pb	—
	SUM23	—	1215	—	—	—	—
	SUM23L	—	—	—	—	—	—
	SUM24L	11SMnPb28	12L14	—	9 SMnPb28	S250Pb	—
	SUM25	12SMn35	—	—	9 SMn36	S300	—
	SUM31	—	1117	—	15S10	—	—
	SUM31L	—	—	—	—	—	—
	SUM32	—	—	—	—	(13MF4)	—
	SUM41	—	1137	210M15,210A15	—	(35MF6)	—
	SUM42	—	1141	—	—	(45MF6.1)	—
	SUM43	44SMn28	1144	—	—	(45MF6.3)	—
JIS G 4805 High carbon-chrome bearing steel	SUJ 1	—	51100	(226M44)	—	—	—
	SUJ 2	B1 or 100Cr6	52100	—	100Cr6	100Cr6	щX15
	SUJ 3	B2 or 100CrMnSi4-4	ASTM A 485 Grade 1	—	—	—	—
	SUJ 4	—	—	—	—	—	—
	SUJ 5	—	—	—	—	—	—

BUSINESS INFORMATION

●Cancellation of orders/Return of Goods 1357
●Contact for Orders 1358

Cancellation Policy/Returning Products

Changing or Canceling Orders

Misumi's cancellation policy varies depending on the published "days to ship" of our products, and may not be accepted. Please contact Misumi Customer Service with any requests of changing or canceling your order. We appreciate your understanding and cooperation.

■In-stock Items

Request of changing or canceling orders can be accepted during normal business hours one business day prior to the scheduled ship date. Please note that request of changing or canceling orders on or after the scheduled ship date cannot be accepted.

■Make-to-Order Items

Most of our products are Make-to-Order items, which are manufactured specifically according to each customer's request for material, size and shape. To deliver the desired products with "industry best" lead-time, we start our order fulfillment process on the same day of order acceptance for standard days to ship order. In the event of an order change or cancellation request on Make-to-Order items, we have already begun the order fulfillment process (order processing, purchase of materials, manufacturing, labor, etc.) and have incurred related expenses.

Standard Quantity Orders

- Standard Shipping Date Orders

When a standard shipping date is specified, changing or canceling orders are difficult since production starts on the day of order acceptance.
However, we accept order change or cancellation requests by customers within 2 hours of the order receipt time free of charge. Cancellation 2 hours after order receipt during normal business hours will be subject to a cancellation charge of 50%.
Please note that changing or canceling orders will not be accepted after normal business hours.

Ex. Placing a 3 "Days to Ship" item order shipping on the 3rd business day (standard shipping date).

Day after Order Placement	Cancellation on Order Day		1st day after	2nd day after	3rd day after
Order Cancellation	Within 2 hours of order placement	By business hours after 2 hours of order placement	N/A	N/A	N/A
	Free of charge	50% Charge			
Production Work	Unperformed	Performed	Performed	Performed	Completed
Number of Days Before Shipment	3 days		2 days	1 day	0

- Future Shipping Date Orders

When a future shipping date is specified, change or order cancellation requests will not be accepted within the standard "Days to Ship" period to the specified shipping date.

Ex. Placing a 3 "Days to Ship" item order shipping on the 10th business day (specifying a future shipping date)

Day after Order Placement	Order Day	1st day after	2nd day after	3rd day after	4th day after	5th day after	6th day after	7th day after	8th day after	9th day after	10th day after
Order Cancellation	Free of charge	Free of charge	Free of charge	Free of charge	Free of charge	Free of charge	Free of charge	N/A	N/A	N/A	N/A
Production Work	Unperformed	Unperformed	Unperformed	Unperformed	Unperformed	May have been performed	May have been performed	Performed	Performed	Performed	Completed
Number of Days Before Shipment	10 days	9 days	8 days	7 days	6 days	5 days	4 days	3 days	2 days	1 day	0

Special Large Quantity Orders

As confirmed on quotations, cancellation of special large quantity orders cannot be accepted.

Returning Products

Returning In-stock products may be accepted under certain circumstances. Please contact Misumi Customer Service on any requests. Please note that shipping charge to return the products to Misumi or to the location Misumi specifies is at the customer's expense.

Returning Make-to-Order items is not allowed since they are manufactured specifically to your unique configuration. For detailed information, please see Article 17 of "Terms and Conditions of Sale" in this catalog or on our website.

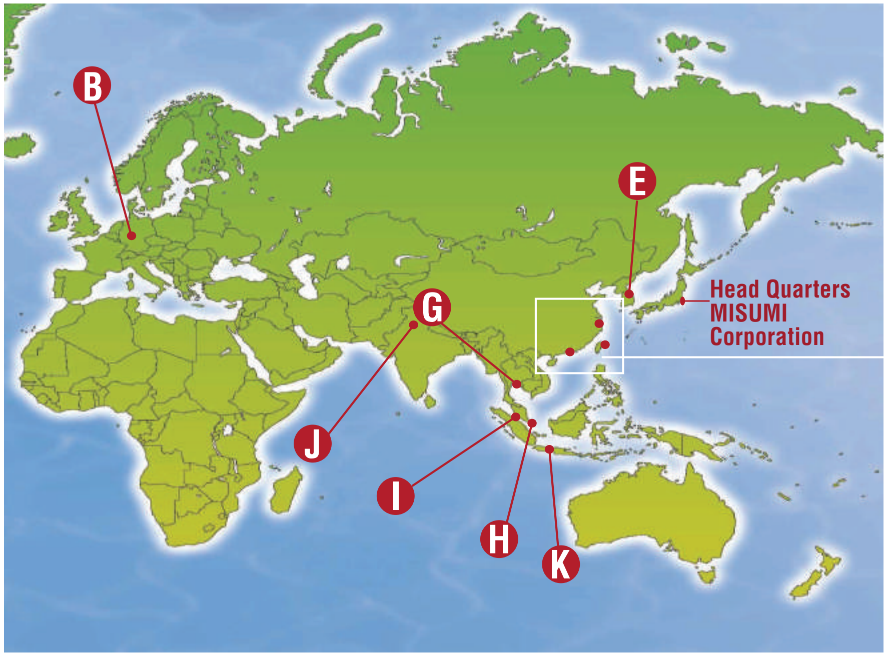
If products received are different from what were ordered, please contact Misumi Customer Service.

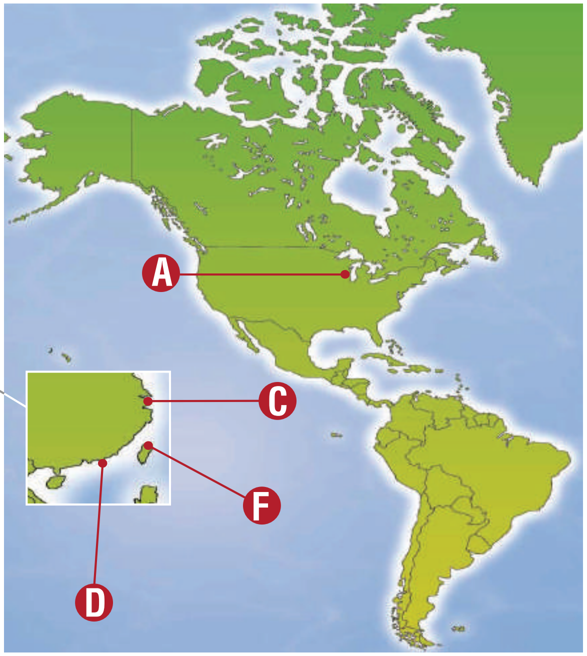
Please note that changing or canceling orders specified with Express Service will be subject to this Cancellation Policy / Returning Products for Make-to-Order items.

This Cancellation Policy / Returning Products are subject to change without notice. Please visit our website for additional information or any changes to this Cancellation Policy / Returning Products.

World Network

–Provide same products and service to anywhere in the world–





Name	Call&Fax	WEB Site/E-mail	Address	AREA
A MISUMI USA, Inc.	Call: +1-847-843-9105 Fax: +1-847-843-9107	http://us.misumi-ec.com/ inquire@misumiusa.com	1717 Penny Lane, Suite 200 Schaumburg, Illinois 60173, U.S.A	North America Central America South America Canada
B MISUMI EUROPA GmbH	Call: +49-(0)6196-7746-0 Fax: +49-(0)6196-7746-360	English: http://uk.misumi-ec.com sales@misumi-europe.com German: http://de.misumi-ec.com verkauf@misumi.de Italian : http://it.misumi-ec.com team.italia@misumi-europe.com French : http://fr.misumi-ec.com team.france@misumi-europe.com Czech : http://cz.misumi-ec.com sales@misumi-europe.com	Katharina-Paulus-Strasse 6, 65824 Schwalbach, Germany	Central/Eastern Europe (CEE) Africa Turkey
C MISIUMI (CHINA) PRECISION MACHINERY TRADING CO.,LTD.	Call: +86-21-6391-7080 Fax: +86-21-6391-7085	http://cn.misumi-ec.com/	11th Floor, Raffles City Shanghai, 268 Xizang Middle Road, Shanghai 200001, China	China
D MISUMI E.A. HK LTD.	Call: +852-8303-2781 Fax: +852-8303-2782	http://cn.misumi-ec.com/	Unit 202 2/F, Malaysia Building, 50 Gloucester Road, Wanchai, Hong Kong	Hong Kong
E MISUMI KOREA CORP.	Call: +82-2-551-3611 Fax: +82-2-551-4811	http://kr.misumi-ec.com/ cs@misumikorea.co.kr	3804 World Trade Center, 511, Yeongdong-daero, Kangnam-Gu, Seoul 135-729, Korea	Korea
F MISUMI TAIWAN CORP.	Call: +886-2-2570-3766 Fax: +886-2-2570-3767	http://tw.misumi-ec.com/	9F-1, No.126 Nanjing East Road, Sec. 4, Taipei 10595 Taiwan	Taiwan

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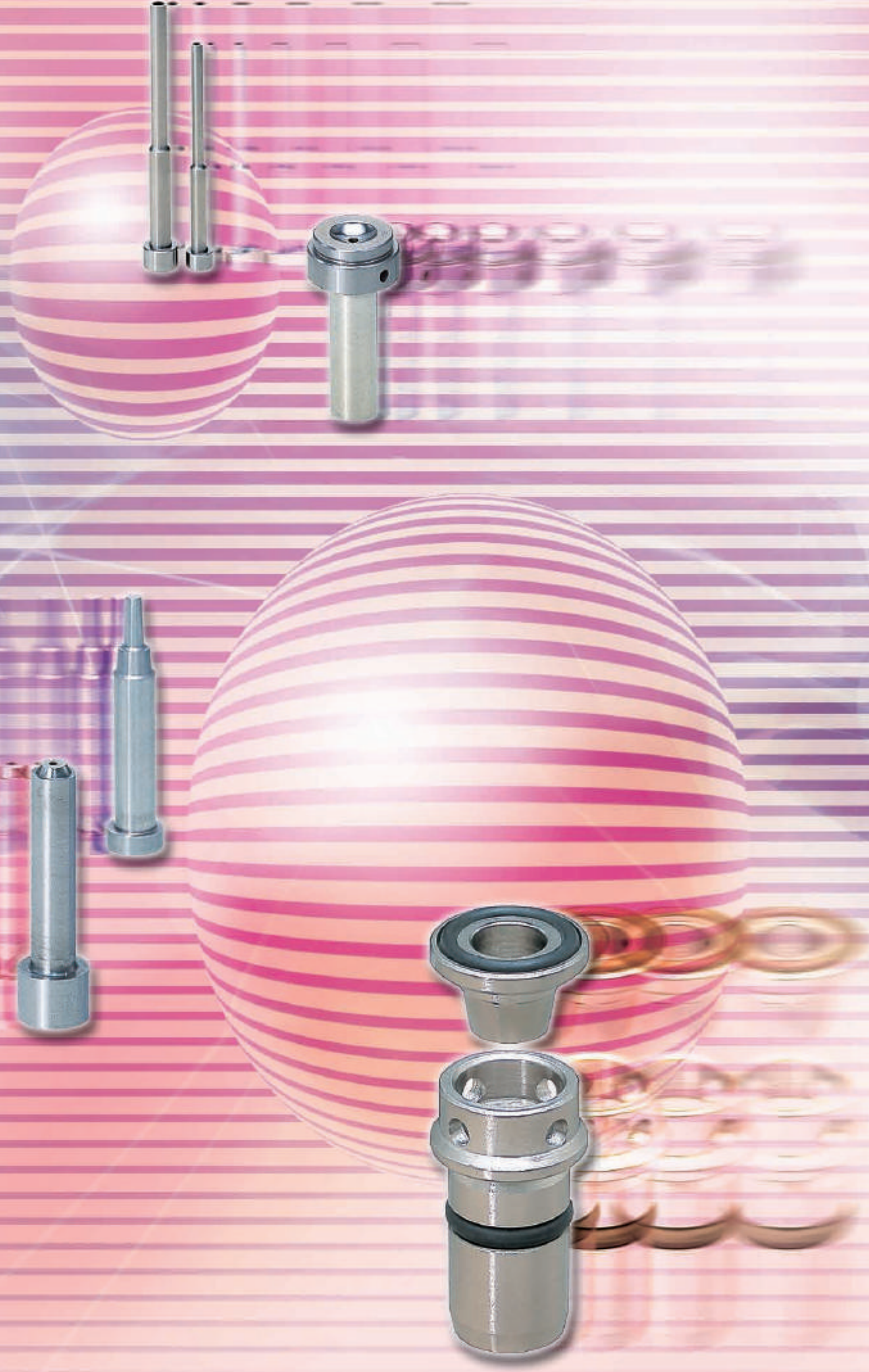
G MISUMI (THAILAND) CO., LTD.	Call: +66-38-959-200 Fax: +66-38-959-202	http://th.misumi-ec.com/ mailto@misumi.co.th	300/24 Moo 1, Eastern Seaboard Industrial Estate, Soi 5, Tambol Tasith, Amphur Pluakdaeng, Rayong Province 21140, Thailand	Thailand
H MISUMI SOUTH EAST ASIA PTE. LTD.	Call: +65-6733-7211 Fax: +65-6733-0211	http://sg.misumi-ec.com/	331 North Bridge Road, #05-03 Odeon Towers, Singapore 188720	Southeast Asia (excludes Thailand) Australia
I MIUSMI MALAYSIA SDN BHD	Call: +60-3-7960-8499 Fax: +60-3-7960-7499	http://my.misumi-ec.com/	Unit 1206, 12th Floor Menara Amcorp No. 18, Jalan Persiaran Barat 46050 Petaling Jaya, Selangor, Malaysia	Malaysia
J MIUSMI INDIA Pvt. Ltd.	Call: +91-12-4468-8800 Fax: +91-12-4468-8811	http://in.misumi-ec.com/	Plot No. 241, Udyog Vihar, Phase – 1, Gurgaon Haryana – 122016, India	India
K PT. MISUMI INDONESIA	Call: +62-21-5789-5837 Fax: +62-21-5789-5836	http://id.misumi-ec.com/	Menara Karya, LT. 28. Jl. H.R. Rasuna Said Kav 1-2, Kuningan Jakarta, Selatan 12950, Indonesia	Indonesia
HEAD QUARTERS MISUMI CORPORATION Mold Components Division	Call: +81-3-5805-7190 Fax: +81-3-5805-7191	http://jp.misumi-ec.com/	Iidabashi First Bldg., 5-1, Koraku 2-chome, Bunkyo-ku, Tokyo 112-8583, Japan	Japan



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Terms and Conditions of Sale
[except MISUMI Europa GmgH]

In this Terms and Conditions of Sale (the “Terms and Conditions”), "the Company" means one of the overseas affiliated companies of MISUMI Corporation or MISUMI Group Inc. (Japan), whose distribution area includes the country where the principal place of business of the Customer (as defined in Article 1.1) is located.

All purchases of products (the “Products”) listed in this catalog (the “Catalog”) will be governed by the Terms and Conditions. The Customer (defined in Article 1.1 below) who utilizes the Catalog and web order service (the “Service”) shall strictly adhere to the Terms and Conditions.

Notwithstanding the foregoing provision, “the Company” under the Terms and Conditions shall not include MISUMI Europa GmbH and all purchases of the Products listed in the Catalog from MISUMI Europa GmbH will be governed by the General Terms and Conditions (GTC) separately set out in the Catalog.

Article 1 Registration

1. To use the Service, the applicant shall complete the customer registration procedures of the Company which provide the Service in the country where the customer’s principal place of business is located. After the applicant has completed the customer registration application procedures in a manner specified by the Company and the Company approves the registration in accordance with the prescribed standards, the Company will issue a Customer Number and the applicant will become a customer (the “Customer”).

   Before the Customer orders the Product via Internet Web Site of the Company, named Web Order System (“WOS”), the Customer is required to apply for WOS registration as well as the customer registration. Please visit our WOS website to understand the WOS registration process.
2. The Company may deny approval of an application to register as a customer of the Company for any of the following reasons.
   (1) The applicant is not registered as a corporation;
   (2) The applicant has already registered;
   (3) The applicant’s principal place of business or postal address as of the time of the customer registration procedures is outside of the distribution area of the Company (“Distribution Area”):
   (4) It becomes evident that the applicant has had its customer registration revoked in the past;
   (5) Any of the details in the customer registration application are untrue;
   (6) It is evident that the applicant is a distributor, or intends to resell.
   (7) The applicant attempts to transfer or sell the customer registration number or user ID.
   (8) Any other matter that the Company deems to be inappropriate to approve the customer registration.
3. When ordering the Products, the Customer shall provide the Customer Number issued to it at the time of registration as a customer under this Article 1.   Please note that the Customer Number is different from the User ID issued after WOS web site registration.
4. Any and all purchase orders made by any User ID under the Customer Code issued for the Customer shall be deemed as orders of the Customer.
5. the Company will notify the Customer by facsimile or by email of sales campaigns and other matters when sending the Catalog or other materials, the Company will not send such information to the Customer if the Customer so requests.

Article 2 Details of the Service

1. The Customer may purchase the Products listed in the Catalog using the Service subject to the provisions of the Terms and Conditions and any terms set out in the Catalog (including, without limitation, specifications, price, delivery date, and instruction and precaution for use). Please be aware, however, that because of the nature of the Products, the Customer’s business or other standards prescribed by the Company, or at the discretion of the original manufacturer or the Company, some of the Products may be removed from the Service without prior notice or warning.
2. The Customer may use the Service provided by the Company website in accordance with the Terms and Conditions and other terms and conditions for use of our website. The Company may suspend or discontinue all or part of such Service for maintenance of machinery or equipments and other reasons, without prior notice or warning to the Customer.
3. The Service is provided within the Distribution Area. This does not apply to areas where deliveries cannot be made. Please direct any queries on the service areas to the Company.
4. If the Customer desires to request the Company a large quantity order of the Products which is required separate quantity for volume discount rate under the Catalog, the price and shipment date of the Products will be determined by the quantity issued by the Company.

Article 3 Ordering the Products

1. The Customer may apply to purchase the Products using the following methods. Provided, however, that the Company may restrict the ordering method depending on Special Orders (as defined in Article 10 below) or the type or quantity of the Products ordered. The date and time the Company may receive an order are set out in the Catalog and the website of the Company. Please note that it may not be possible to use the following methods depending on the country.
   (1) Internet orders: fill in the required fields in the web site of the Company. Please visit website of the Company or consult the Company for details on how to use the website.
   (2) Facsimile orders: fill in the required fields on the order sheet specified by the Company and send the order sheet to the fax number specified by the Company.
2. Orders made by the Customer shall become effective upon receipt of the order from the Customer in accordance with Article 3.1 by the Company. If the Company is unable to receive the order due to a problem with any telecommunication service or any of the details required for the order are missing, the order shall not be deemed effective. In this case, the Company shall not be liable in any way for the Customer not being able to purchase the Product or any damages arising in connection therewith.
3. Orders made by the Customer will constitute a sales agreement upon receipt of the order by the Company under Article 3.1. Provided, however, that this will not apply if the Company notifies the Customer that it declines the order immediately after receiving the order. In this case, the Company shall not be liable in any way for the Customer believing that the order constitutes a sales agreement or any damages arising in connection therewith. If the Company deems it particularly necessary, it will additionally execute a written sales agreement with the Customer and change the terms of sale.
4. Please be aware that the Company may claim from the Customer any expenses the Company incurs in connection with requests from the Customer.

Article 4 Indemnification

The Customer may order the Products on the following conditions with respect to the use of the Products. The Customer will defend, indemnify, and hold harmless the Company and its affiliates, its parent company, and their respective officers, employees, and agents, from and against any liability, damage, claim, or any litigation cost or expense (including but not limited to reasonable attorneys’ fees) from third party claims arising out of or relating to the violation of any of the following conditions:

   (1) The products are to be used as a component of general production equipment or for commercial use or industrial application (“General Industrial Use”). Please note that General Industrial Use does not include any use in transportation devices with the purpose of transporting humans such as automobiles, vehicles, or ships, medical equipment with the purpose of curing and diagnosing humans, or consumer goods that are used in general households such as electronic and electric equipment.
   (2) The Products may not be used in aerospace equipment, nuclear energy equipment, or military related products such as weapons or arms.
   (3) The Products or any equipment for General Industrial Use (or parts thereof) will not be used in, exported to or soled to any country outside country of purchase.
   (4) the Company provides the Service on the condition that the Customer orders and uses the Products at its sole responsibility and in compliance with matters relating to the Products that are listed in the Catalog such as the specifications, intended uses, instruction and precaution for use, conditions of use, drawings and other information of the Products, and any notice or other description in documentation or labels that comes with the Products (or their accessories).

4. The Products may not be resold to a third party, incorporated in products offered to general consumers or used in any other similar manner without the written consent of the Company.

Article 5 Days to Ship, Overseas Delivery, and, Title and Risk of Loss

1. The Company will ship the Products from its warehouse or suppliers in accordance based on the required number of days to ship of the Products (“Days to Ship”) set out in the relevant page of the Catalog. However, depending on the type and quantity of the Products ordered (for example, due to customization of Products or the large quantity order), or depending on the time when the order is placed, the Company may determine alternative shipping dates.
2. For shipments outside the country where the Company’s principal place of business is located, shipments will be sent freight and duty collect by a carrier of the customer’s choice.
3. Title and risk of loss pass to the Customer upon tender of shipment of the Products for shipment to the carrier. If the Product is damaged in transit, the Customer shall file claim with the carrier.
4. Unless otherwise provided in the Catalog, the Days to Ship will start on the next business day following the day the sales agreement is concluded between the Customer and the Company under Article 3.3, excluding any holiday of the Company. If the time the Customer sends an order and the time the Company receives such order differs, the Day to Ship will be calculated from the time the Company receives such order.
5. The Days to Ship and dates when the Products are actually delivered to the Customer is different. When ordering the Products, please see the period required for the delivery by area set out in the Catalogs. Please be aware that the Products may not be delivered within the delivery periods set out in the Catalog due to transportation factors such as weather, traffic jams, or road construction, the timing of the delivery (such as during New Year holidays, Christmas holidays, or other holidays), the inventory status of the Products, or any other reasons, and in this case the Company shall not be liable to the Customer in any way.

Article 6 Delivery of the Products

1. Delivery of the Products is deemed to be completed when the Products is delivered to the place registered by the Customer or designated by the Customer at the order. Upon receiving the Products, the Customer is requested to affix its seal or representative’s signature to the delivery company’s form as proof of receipt.
2. The Products may not be delivered if the Customer’s company name, factory name, research institute name, nameplate or other verification of the Customer cannot be confirmed.
3. If the Products are delivered to a location other than that specified by the Customer, the person receiving the Products may be required to provide personal identification such as a license or passport. (In this case, details such as the address, name and registration number in the license or passport provided may be copied.)

Article 7 Inspections

1. Within one (1) week of receipt of the Products, the Customer must inspect the Products to confirm the name, part number and quantity of the Products and verify that there is no damage, deformation, defects or flaws (including if the specifications do not meet those listed in the Catalog or, in the case of special orders, specified in the Customer's drawings) (collectively “Defects”) in the Products. If the Products fail to meet the specifications or have any Defects, the Customer shall give written notification to the Company within one (1) week of receipt of the Products, and then send the Products failing the inspection and the detail report stating the cause and status thereof to the address designated by the Company.
2. Please note that the Company may deem that the Products have been inspected and approved by the Customer if it does not receive notice within one (1) week of receipt of the Products by the Customer.

Article 8 Measures for Defective Products

If it is discovered through the inspection set out in Article 7 that all or part of the Products fail to meet the specifications, the Company will check such Products. If it is clear to the Company that the defects are attributable to only the Company, the Company will promptly deliver a replacement of the Products (or provide the service again in the case of a service) or, if directed by the Customer, refund the amount paid by the Customer for the part of the Products that is defective.

Article 9 Extra Products

If the Company delivers to the Customer a greater quantity of the Products than that which the Customer ordered and such mistake is attributable to the Company, the Customer shall contact the Company and return the extra Products to the Company promptly. In this case, the Company will pay for all shipping costs incurred in returning the extra Products. The Customer is kindly requested to keep the extra Products in its original condition and packaging from the time it receives such Products until it returns them to the Company.

Article 10 Special Orders

If the Customer orders products with specifications set out in drawings provided by the Customer, the special products with the specifications outside the standard specifications in the Catalog or other special orders (“Special Orders”), ordering procedures and the Service are different from the orders for the standard Products listed in the Catalog. Other than the ordering procedure for Special Orders, the Terms and Conditions apply to Special Orders to the extent that they do not contradict the nature of the Special Orders.

Article 11 Applicable Taxes

The Customer shall additionally pay an amount equivalent to all applicable taxes incurred in using the Service, including VAT and any sales taxes, if any.

Article 12 Payment

1. The Customer shall pay the purchase price for the Products it has purchased and all taxes imposed thereon by any of the methods set out in the Catalog and selected by the Customer at the customer registration; provided, however, that the Customer may be required to change the payment method upon request from MISUMI. The payment term (“Payment Term”) shall be determined at the customer registration. Please be aware that the Company may request advance payment from the Customer if it is a new customer, depending on the status of a transaction or for other reasons.
2. The Company will send invoices for the Products shipped and the Customer shall make all payment for such invoice amount in accordance with the Payment Term. The Customer shall be liable for the relevant bank fee of such payment, if any.
3. If the Customer fails to pay the amount for the Products and all taxes by the due date based on the Payment Term, regardless of the reason for such delay, a default charge may be additionally imposed on the unpaid amount at the rate determined by the Company separately or if such rate is higher than the highest rate of interest permitted by applicable law, such highest rate, until paid in full.
4. If payment by the Customer cannot be confirmed by the specified due date   based on the Payment Term, please be aware that the Company may carry out predetermined procedures such as suspending the Customer's order and shipment of ordered products, or revoking the Customer's registration.
5. If the Customer desires to change its payment method, please contact the Company. The new payment method will apply to orders from the next month. Please note that longer period may be required for procedures to change the payment method depending on the payment method.

Article 13 Maximum Credit Amount

1. The Company will set a maximum credit amount that the Customer can owe to the Company for the total purchase of the Products at any given time (the “Maximum Amount”).
2. The Company may, at its discretion, take any of the following ways if the total price for the Products ordered by the Customer exceeds the Maximum Amount or if otherwise necessary with respect to the Maximum Amount. In such case, please be aware that it may not be possible to deliver the Products by the prescribed delivery date.
   (1) Requesting the Customer pay in advance or pay the outstanding amount.
   (2) Refusing the order.
   (3) Any other method determined by the Company.
3. Please contact the Company to check the Customer’s Maximum Amount.

Article 14 Refusal to Receive Products

If the Customer refuses to receive the Products or the Products cannot otherwise be sent to the Customer’s address for reasons attributable to the Customer (such as nobody being at the address to receive the Products), the Company will consider the sales agreement for such Products to be automatically terminated. Please be aware that in this case the Customer shall pay an amount equivalent to the price of the Products and any damages incurred by the Company. Provided, however, that this will not apply if the Company believes there are special circumstances in light of the nature, type, or quantity of the Products, the distribution system used or any other factor.

Article 15 Force Majeure Disclaimer

If any delivery of products is delayed or impossible due to natural disasters (including, without limitation, earthquakes, floods and fires), amendments to or abolishment of laws or ordinances, dispositions through exercise of a public authority, transportation-related problems, labour disputes or any other circumstances beyond the control of the Company, the Company will notify the Customer within a reasonable period considering such circumstances. Provided, however, that the Company shall not be liable in any way for any damages or expenses incurred by the Customer due to such delay or failure in delivery.

Article 16 Changing or Cancelling Orders

1. The Customer may change the details of or cancel an order ("Cancellation"), in accordance with the “Cancellation Policy” set out in the Catalog (the “Cancellation Policy”). For Cancellation, please contact the Company by telephone on or before the date and time of corresponding set out in the Catalog. Notwithstanding the foregoing, the Company reserves the right not to accept Cancellation because of the nature, type, quantity or shipping date of the Products, or the distribution system, or other relevant factors..
2. Depending on the time of requesting the Cancellation, type and quantity of the Products and other factors, the Customers may have to pay a cancellation charge pursuant to the terms set out in the Catalog or in the Cancellation Policy.
3. The Customer may not cancel its order unless such cancellation is in accordance with the provisions of this Article 16.

Article 17 Returning and Replacing Products

1. The Customer may return or replace the Products (“Returns”) after the inspection period specified in Article 7, unless any of the following cases apply:
   (1) Products are not designated as "Stock" in the Catalog.
   (2) Products that have been opened, unpacked or used.
   (3) Special Orders under Article 9 of the Terms and Conditions or Products that are otherwise order-made for Customer.
   (4) Products ordered by Company from a third party at Customer's request.
   (5) Products that have deteriorated or been damaged due to an error in Customer's use.
   (6) Products that Customer wishes to return because of Customer's preferences such as Products not suiting Customer's tastes (having a different color or appearance from that in Catalog).
   (7) Products that have marks or damage attributable to the Customer.
   (8) 30 days have passed since the date of delivery of Products.
   (9) The Customer has placed a large quantity order for Products.
   (10) Dangerous goods.

For Returns, shipping costs shall be borne by Customer. Please be aware that the Company may charge a handling or restocking charge   for such Cancellation in addition to such shipping cost in accordance with the Cancellation Policy or the Warranty applicable to the Service provided to the Customer. The Customer shall contact the Company to confirm Return is acceptable and the Company will inform the Customer whether Return is acceptable and how to return the Products. The Customer shall store the returned Product in suitable conditions in light of nature of the Products until Return is completed.

2. Notwithstanding the provisions of Article 17.1, if there are any Defects in the Products or the wrong Products are delivered due to the reason attributable to the Company, please contact the Company within the period mentioned in Article 17.1(8). By information from the Customer, the Company will determine whether the damage or wrong delivery is attributable to the Company and if the Company acknowledge thereof, the Company accept return of the Products. The postage costs incurred in returning the Products will be borne by the Company. If the Company cannot confirm the condition

of the Product, the Company may reject the Return of the Product.

Article 18 Warranty

1. The Warranty Standard, that is the sole warranty made with respect to the Products separately set out in the Catalog (the "Warranty").

THE COMPANY'S WARRANTY HEREIN IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES OF THE COMPANY, THE MANUFACTURER OF THE PRODUCTS, AND ANY OTHER ENTITY INVOLVED IN THE MANUFACTURE, SALE, OR SERVICING OF THE PRODUCTS (OR ANY PORTION THEREOF) AND THEIR RESPECTIVE SUBSIDIARIES, AFFILIATES AND RELATED COMPANIES (HEREINAFTER COLLECTIVELY REFERRED TO AS THE "MANUFACTURING AND SELLING COMPANIES"), EXPRESS, IMPLIED OR STATUTORY, OR OTHERWISE CREATED UNDER APPLICABLE LAW, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE.

2. In case that no warranty is applied to the defect of the Products under the Warranty, repair or replacement of the Products will be charged and the Customer is required to pay the repair or replacement fee separately designated by the Company, provided, however, that the defect of the Products may not be repaired or replaced because of the nature, manufacturing date or specifications of the Products in issue.

Article 19 Revocation of Registration and Termination of Sales Agreements

1. If any of the following cases apply to the Customer, the Company may revoke the Customer's registration, suspend or discontinue a part or all of the Services without prior notice, and immediately terminate any sales agreements it has entered into with the Customer without further notice:
   (1) If it becomes evident that any of the cases set out in Article 1.2 apply to the Customer.
   (2) If the Products are used for the purpose other than General Industrial Use.
   (3) If the Products are used in aerospace equipment, nuclear energy equipment, or military related products, such as weapons or arms.
   (4) If the Products are resold to a third party, incorporated in products offered to general consumers, or used in any other similar manner without the written consent of the Company.
   (5) If the Customer delays in or fails to perform its obligations arising through use of the Service and fails to remedy this within seven (7) days, regardless of the Company's notification to the Customer demanding remedy thereof.
   (6) In addition to Article 19.1(5), if the Customer breaches any of the Terms and Conditions and fails to remedy this within fourteen (14) days, in despite of the Company gives notification to the Customer demanding remedy thereof.
   (7) If the Customer sustains a disposition from the relevant supervisory agency, such as a cancellation or suspension of its business operations.
   (8) If the Customer is subject to a suspension of payments or becomes insolvent, or a check issued by the Customer is subject to dishonor.
   (9) If the Customer's credibility substantially deteriorates or there is a material change to its business that will affect its credibility.
   (10) If the Customer is subject to a petition for attachment, provisional attachment, provisional disposition or any other compulsory execution or auction filed by a third party, or is subject to a disposition to collect tax or other public charges delinquencies.
   (11) If a petition for bankruptcy, reorganization or other insolvency proceeding is filed against or by the Customer.
   (12) If the Customer passes a resolution to dissolve or merges with another company.
   (13) If it becomes difficult for the Customer to perform its obligations under the Terms and Conditions or any sales agreements due to a natural disaster, labour dispute or other reasons.
   (14) If the Customer defrauds the Company or commits any other acts in bad faith that makes it difficult to continue the Customer's membership.
   (15) If the Customer's financial condition deteriorates or there are grounds to objectively believe this may occur.
   (16) If the Company cannot contact the Customer using reasonable methods of communication.
   (17) If the Customer cancels its registration at its own discretion under Article 21.
   (18) If the Customer has not placed an order for one (1) year or more.
   (19) If the Customer carries out any of the prohibited acts under Article 29.
   (20) If there are grounds that otherwise make the Company believe the Customer is inappropriate as a customer for the Service.
2. If any of the above cases apply to the Customer, all obligations owed by the Customer through use of the Service will become immediately due and payable, and the Customer shall promptly pay all such obligations. Further, the Customer shall indemnify the Company for any damages incurred by the Company due to the Customer's breach of any provisions of the Terms and Conditions.

Article 20 Notification of and Changes to Registered Information

1. If there are any changes to the company name, address, representative, telephone number, fax number, contact person, e-mail address or other information registered by the Customer at the time of applying for customer registration or user registration of WOS, the Customer shall immediately notify the Company of such change in writing or through WOS website and follow the prescribed procedures.
2. In addition to Article 20.1, if (i) the Customer transfers its business to a third party, receive an assignment of a business from a third party or undergo a merger, or (ii) any of the circumstances set out in Article 19.1 occur, the Customer shall immediately notify the Company. In this case, the Company may, if it deems it is necessary, request consultation with the Customer about whether to continue transactions and the Customer's registration.
3. If the Customer fails to notify or delays in giving the notice provided in Article 20.1 or 20.2, and the Products and the Catalog and any administrative communications are not delivered to the Customer or such delivery is delayed, the Company will deem such items to have arrived or been received by the Customer at the time they would normally reach the Customer. Further, the Customer shall pay for all shipping costs in sending such items to its new address, costs incurred in replacing the Products and any additional fees incurred by the Company.

Article 21 Cancellation of Registration by the Customer

The Customer may cancel its registration by notifying the Company in a manner prescribed by the Company. Upon receipt of such notification, the Company will delete the registration of such Customer, and the Customer will lose its status as a customer at the time such revocation is registered.

Article 22 Governing Law: Jurisdiction

The Terms and Conditions, the sale or purchase of the Products, and/or the relationship of the Customer and the Company shall be governed by and construed in accordance with the laws of the country or state where the Company has its principal place of business, excluding that body of such law concerning choice of law. Any claim or dispute arising out of or related to the Terms and Conditions, the sale or purchase of the Products, or the relationship of the Customer and the Company shall be brought exclusive and finally in the court having jurisdiction over the location of the Company's principal place of business, and the Customer and the Company hereby submit to and waive any objections to the exclusive jurisdiction hereof.

Article 23 Revisions to Price and Specifications

The Company may, at its discretion and with or without notification, suspend sales of the Products and/or revise Product information published in the Catalog ("Revisions") including but not limited to pricing, the Days to Ship, delivery period, and/or design specifications of the Products. Should the Company decide to make notification to the Customer of such Revisions it may choose the timing, media and other methods concerning notification at its discretion. Should the Customer order the Products after such Revisions, the Customer will be deemed to have approved such Revisions.

Article 24 Approval to Amend the Terms and Conditions

The Company may revise, modify or amend the Terms and Conditions ("Amendments") and will set forth such Amendments on the Company's Internet website (pages for products catalog and the Terms and Conditions). If the Customer orders the Products after such Amendments, the Customer will be deemed to have approved such Amendments.

Article 25 Effective Term of Catalog

1. The Catalog is effective only until the following event is occurred unless otherwise specified by the Company (the "Catalog Effective Term"). Please be aware that, unless the Company indicates otherwise, the Customer will not be able to make any orders from the Catalog after expiration of the Catalog Effective Term.
   (1) When the Company publishes a latest version of the Catalog or other alternative catalog
   (2) When the Company notifies the Customer that the Catalog cannot be used or is invalid. In the event that any of the above-mentioned event occurs, the Company will place a notice on the on the Internet website of the Company (product catalog pages). Please kindly check the Internet website of the Company periodically.
2. The expiration of the Catalogs Effective Term shall not limit in any way the effect of this provision. The Company shall not be liable in any way to the Customer for any expenses or damages incurred by the Customer as a result of making an order from a Catalog whose effective term has expired.

Article 26 Priority of the Terms and Conditions

The Terms and Conditions apply equally to all Customers who use the Service. The Customer shall fully understand the Terms and Conditions and the contents of the Catalog before using the Service. If there is any contradiction between the Terms and Conditions and any agreement or other contract separately entered into between the Customer and the Company (including any agreement terms on order forms used by the Customer), the Terms and Conditions shall take priority.

Article 27 Disclaimer Concerning Internet Services

1. When the Customer views information or receives the Services or the like by using the web site of the Company (the "Internet Service"), the Customer does so at its own risk and shall do so in accordance with the Terms and Conditions as well as in accordance with the individual Terms and Conditions and regulations pertaining to individual services and with laws and ordinances.
2. The Company is working to improve the quality of the information and services it provides through the Internet Service, but does not warrant the safety, reliability, usability, fitness for a particular purpose, newness, legality, ethicality, or imperviousness to computer viruses of, for example, the Products, information, and services provided through the Internet Service, unless caused by the Company's willful misconduct or gross negligence.
3. The Company addresses security matters, such as preventing information divulgence, but asks the Customer to be aware that there is a risk that information might be divulged and that absolute security thereof cannot be completely assured.
4. The Company shall not be liable in any way for any damages the Customer incurs in relation to using the Internet Service (including damages caused by undelivered orders made through the web site), unless such damages are caused by the Company's willful misconduct or gross negligence.
5. The Company shall not be liable in any way for any damages that the Customer incurs as a result of using the Internet Services in a way other than the ordinary way of using it.

Article 28 Temporary and Permanent Discontinuation of the Services

In the event that any of the following occur, Company reserves the right to suspend or discontinue, part of, or all aspects of the Service, without prior notice to the Customer.

(1) If and ordering system or equipment is damaged or rendered unusable due to natural disaster (including, without limitation, earthquakes, floods and fires), a power failure or similar event, or damage to the lines of a telecommunication carrier or internet provider or other infrastructure.
(2) If delivery of the Products is impossible due to a natural disaster (including, without limitation, earthquakes, floods, and fires), the enactment or abolishment of a law or ordinance, a labour dispute, or any other unavoidable situation.
(3) If ordering system or equipment requires repair or maintenance.
(4) If the Company otherwise believes the suspension or discontinuation of the Service is necessary in relation to the operation of the Service.

Article 29 Prohibited Acts

The Customer may not carry out any of the following acts while using the Service:

(1) Register false details in its customer registration.
(2 Carry out an act that would or might interfere with the operation of the Service.
(3) Make an order under another name or a false Customer Number or User ID.
(4) Act in a way that would or might be detrimental to another Customer, a third party or the Company or cause another Customer, a third party or the Company trouble or to incur damages.
(5) Carry out any act that would or might infringe any copyright or other intellectual property right or any right to privacy or other right of another Customer, a third party, or the Company.
(6) Illegally access to the Service via Internet and falsify information.
(7) Use the Service via Internet to send or post harmful computer viruses or programs.
(8) Carry out any act that would or might contravene public policy or any law or ordinance.
(9) Assign or transfer any of the Customer's right and obligations which may arise in connection with the Service.
(10) Carry out any act that the Company otherwise deems inappropriate.

Article 30 Copyright

1. Without the approval of the copyright holder, the Customer shall not use any of the information provided through the Service beyond the scope of applicable Copyright Law.
2. The Customer shall indemnify and hold harmless the Company from and against any claims or damages in connection with problems arising through the Customer's breach of this Article 30.

Article 31 Management of Customer Numbers and Password

1. The Customer is responsible for managing its registered Customer Number, User ID and their passwords.
2. The Customer may not transfer, lend or disclose its registered Customer Number, User ID and passwords to a third party.

Article 32 Personal Information

1. Any personal information of Customer collected by the Company through the Service will be used for the following matters:
   (1) To provide corporate information, business information and events by the Company and its affiliated companies.
   (2) To provide Product information or surveys regarding machinery related business or diversified business of the Company and its affiliated companies.
2. The Company will not disclose or provide to a third party any personal information of the Customer obtained in relation to use of the Service, except for the following cases.
   (1) When disclosed to the courier company or manufacturer who deliver the Products to the Customer or otherwise necessary to provide the Service.
   (2) When the Customer agrees to the Company disclosing its details such as its name, address, telephone number or email address.
   (3) When disclosure is required by laws, regulations or ordinances.
3. All Personal Information of the Customer shall also be protected in accordance with the Privacy Policy of the Company provided on its website.

Article 33 Limitation of Liability

IN NO EVENT SHALL THE COMPANY AND/OR THE MANUFACTURING AND SELLING COMPANIES BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, OR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE ABILITY OR INABILITY TO USE THE PRODUCTS, WHETHER OR NOT CAUSED BY OR RESULTING FROM THE NEGLIGENCE OF THE COMPANY AND/OR THE MANUFACTURING AND SELLING COMPANIES, UNLESS SPECIFICALLY PROVIDED HEREIN. IN NO EVENT SHALL THE COMPANY'S LIABILTY HEREUNDER OR OTHERWISE ARISING RELATIVE TO THE SALE OF THE PRODUCT EXCEED IN ANY EVENT OR UNDER ANY THEORY OR CAUSE OF ACTION, THE PURCHASE PRICE PAID BY THE CUSTOMER TO THE COMPANY FOR THE PRODUCT.

Article 34 No Cooling-Off Rule

To the extent permissible by applicable law, no cooling-off period will apply to mail-order sales of the Products listed in the Catalog.

Article 35 Information Provision and Product Procurement Service

The Terms and Conditions apply to services other than sale of the Products listed in the Catalog, provided that they do not contradict the nature of such services and any terms and conditions provided by the Company for such services. The Company may separately stipulate details regarding such services and the Customer shall use such services in accordance with such separate stipulations.

Article 36 Communications with the Company

Please place orders, give notifications and make any other communications regarding transactions to the Company during the business days and business hours of the Company set out in the Catalog. Please contact the Company regarding any problems with the Products or other technical consultations. Please see the Catalog for all other details.

Article 37 Business Day

The Company may, at its discretion, set the date for performing the Service (including, without limitation, the date of registration, order, and or delivery). Please be aware, however, that the Company may change such date without notifying the Customer in advance.

Article 38 Consultation

Any matters not provided for in the Terms and Conditions shall be dealt with in accordance with the spirit of the Terms and Conditions upon consultation between the Company and the Customer.

(The Terms and Conditions have been enacted on August 1, 2015. The Terms and Conditions apply to the Catalog and each subsequent Catalog.)

General Terms and Conditions (GTC)
[for MISUMI Europe GmbH]

1. General remarks and scope

1.1.

These General Terms and Conditions (hereinafter "GTCs") of MISUMI Europe GmbH (hereinafter "MISUMI" or "company") shall exclusively apply to all contracts, deliveries and other services including consulting services. They shall be binding for the entire term of the business relationship with the purchaser (hereinafter also "customer" or "orderer") and for all subsequent contracts, deliveries and other services. Any other General Terms and Conditions or Conditions of Purchase are herewith expressly disclaimed also with regard to the future; the latter shall only apply when explicitly agreed to in writing by MISUMI. This also applies in the event that the customer places an order or confirm an offer submitted by MISUMI with reference to his own business or purchasing terms.

1.2.

Unless otherwise expressly agreed in writing, the following GTCs shall exclusively apply to business relationships with an entrepreneur within the meaning of section 14 BGB (German Civil Code), a legal person under public law or a special fund under public law within the meaning of section 310, subs. 1 BGB.

1.3.

Sales of goods (hereinafter also "products") are subject to a proper registration of the customer as well as the confirmation of the registration by MISUMI and shall be excluded for private persons or consumers within the meaning of section 13 BGB (German Civil Code).

1.4.

In the event that a follow-up contract is concluded with the same customer as a result of the previous contractual relationship which was based on these GTCs, the present GTCs shall be effective and applicable to such follow-up contract even without explicit reference thereto.

1.5.

This contract as well as any follow-up contracts shall be governed by MISUMI's GTCs as amended from time to time. At the customer's request, the present GTCs will be submitted in written form to the customer either in German or as a translation thereof into the English, Italian or Czech languages.

1.6.

The following terms are frequently used in these GTCs and shall therefore be explained for a better understanding. This explanation is for illustration purposes only and does not represent a final definition in a legal sense. Order: Ordering a product means to make a purchase offer via the distribution channels offered by MISUMI (online via the MISUMI Web Ordering System (WOS) under www.misumi-europe.com or per e-mail/fax/letter) which then may be accepted by MISUMI.

Catalog: Product catalog issued by MISUMI in the respectively applicable version or currently published electronic overview on the MISUMI product range.

Registration:

Online registration: Full and proper registration of the customer with MISUMI using the online form „Web Ordering System (WOS) customer registration" on the www.misumi-europe.com website, upon which MISUMI sends the customer his WOS access data via electronic mail.

Offline registration: Proper registration of the customer by returning the completed MISUMI registration form provided with date, signature as well as company stamp, upon which MISUMI sends the customer his WOS access data via electronic mail.

1.7.

Special order: Orders of products which are, by derogation from the MISUMI catalog product range, provided with particular customer specifications; these orders are transmitted in writing to MISUMI via the usual ordering channels. Other special orders are so-called big orders, i.e. orders of products whose quantity exceeds the maximum quantities indicated in the printed catalog or in the online catalog within the scope of the volume discount scale as well as inventory items for which the amount ordered by the customer exceeds MISUMI's maximum storage quantity for the respective article; MISUMI will inform the customer on the fact that the order constitutes a big order in writing or by telephone after receipt of such order.

1.8.

Stocks: Products which are in principle kept in stock by MISUMI in the corresponding configuration and quantity and/or which are denoted "STK" or "STKJ" in the order confirmation.

2. Registration:

2.1.

Ordering MISUMI products requires that the customer is fully and properly registered with MISUMI and that MISUMI has confirmed the customer's registration as well as the opening of a company account. A valid VAT identification number is also required for duly proper and complete registration. In this case, the customer is given a customer identification number which must be indicated upon ordering.

2.2.

With the registration, the customer gives his consent to be informed by MISUMI by mail, fax or e-mail on product offers or other special matters of the company. The customer may at any time revoke his consent to receive this information.

2.3.

The customer shall be responsible to treat his personal customer identification number as confidential and not to disclose it to any third parties.

2.4.

The customer may not transfer, lend or disclose his registered customer identification number to any third parties.

2.5.

The customer may cancel his registration at any time by notifying MISUMI that he wishes to cancel the latter it in a letter to be signed by an authorised person and marked with a company stamp. If MISUMI receives such letter, it will delete the registration data in line with the statutory provisions according to the German Data Protection Act (BDSG) upon fulfilment of any and all existing contracts.

2.6.

MISUMI reserves the right to refuse or to revoke a registration at its reasonable discretion without stating a reason. This is particularly the case if:

the customer is not an entrepreneur within the meaning of section 14 BGB (German Civil Code);
the customer has not entered all mandatory information required in the registration form;
the customer has already been registered;
the customer’s (principal) place of business, company headquarters or postal address at the time of registration is outside the European Union (EU) or not in those countries where MISUMI offers its products via catalog;
the customer has previously had his registration revoked by the company;
the customer moves his place of business or registered office into a country in which MISUMI does not distribute its products after his registration has been confirmed. Enquiries regarding countries to which MISUMI products are delivered can be directed to the company under the address indicated under item 15;
the customer has provided untrue or incomplete information in connection with his registration;
the customer discloses, lends or assigns his identification number without being authorised to do so;
for any other reasons (including without limitation, the customer's economic circumstances) entitling MISUMI in its view to reject or revoke the registration.

3. Offer and conclusion of contracts

3.1.

All offers submitted by MISUMI are subject to confirmation and without obligation, unless they are explicitly marked as binding or contain a deadline for acceptance. They are invitations to prospective customers to place a binding order with MISUMI. After the customer has placed his order, contracts are not entered into before receipt of MISUMI's written order confirmation, that is not by MISUMI merely acknowledging receipt of the order or by informing on or quoting prices; contracts shall, however, be entered into at the latest when the products are handed over. MISUMI's order confirmation and - in addition to the present GTCs - any terms and conditions of sale and delivery published shall determine the contents of the contract. Any agreements deviating therefrom always require an explicit confirmation in writing by MISUMI.

3.2.

Information about the subject of the products or services (e.g. weight, dimensioning, loading capacity, tolerances) as well as drawings, figures or CAD data indicated by MISUMI are only roughly applicable and do not represent any warranty, to the extent that the information has not been warranted in writing, at least however in text form.

3.3.

By placing the order, the customer bindingly declares that he intends to acquire the product ordered. MISUMI shall not be obliged to accept or process any order for products. A contract shall not come into effect until MISUMI has accepted the order by sending a written order confirmation.

3.4.

Any entitlements the customer may possibly have for a VAT refund cannot be recognised if MISUMI did not have a valid VAT identification number from the customer when the order was placed.

3.5.

The order confirmation including these GTCs shall be the only relevant document governing the legal relationship between MISUMI and the customer and must be made in writing or at least in text form.

3.6.

After receipt of the written order confirmation, the customer has to check it without delay and inform MISUMI promptly about any deviations from the order. If the order confirmation contains an explicit reference to a deviation from the order (e.g. different quantities/dimensions), the customer has to object in writing without delay. The customer shall pay for any expenses incurred in vain by MISUMI or any damage arising from a missing or delayed notification of or objection to defects. The customer shall be entitled to provide evidence that MISUMI has not incurred any or only minor damages due to the customer's missing or delayed notification of defects.

3.7.

Any amendment and modifications to the agreements entered into including these GTCs must be in writing or submitted at least in text form in order to be valid.

3.8.

MISUMI shall retain the ownership and intellectual property rights in all catalogs and electronic overviews on its product range and cost estimates published by the Company, as well as drawings, figures or calculations submitted to the customer. Without MISUMI's prior consent, these documents may neither be reproduced nor disclosed to third parties.

3.9.

If an order exceeds customary quantities or if these are not fully available to or cannot be supplied by MISUMI, the latter reserves its right to limit the quantity accordingly. The order confirmation then comprises an offer to conclude a new contract. The customer accepts this offer by confirming it in writing or by accepting the order confirmation without complaint.

3.10.

Upon the customer's enquiry or at his special request, MISUMI will submit a price information/quotation. This price information/quotation shall be subject to confirmation by and without obligation for MISUMI and does not represent an acceptable offer for MISUMI (cf. items 3.4 - 3.5).

3.11.

The conclusion of the contract shall be subject to the proviso of a correct and timely self-supply by MISUMI's suppliers. This only applies to cases where MISUMI is not responsible for the non-delivery. If the requested products are not available, MISUMI will inform the customer accordingly without delay.

3.12.

Verbal or telephone orders shall be excluded.

3.13.

The information contained in MISUMI catalogs (e.g. information on prices or delivery times), in printed or electronic overviews on its product range or, for example, in advertisements does not constitute an offer. MISUMI reserves the right to correct, modify or delete such information at any time.

3.14.

Upon request, the customer may place special orders (cf. item 1.7). MISUMI will verify the corresponding enquiries and, if applicable, calculate a price for this special order and inform the customer accordingly. If the customer is interested, he may then place an order in line with the above conditions. These special orders shall also be subject to the present GTCs, unless otherwise agreed by the parties; if this is the case, such individual agreements shall prevail over these GTCs.

4. Modifications to orders, returning of dispatched products

4.1.

Modifications and cancellation of orders: MISUMI gives the customer the possibility to modify or cancel his orders in line with the following provisions:

The provisions of this item 4 shall not affect the customer's statutory rights. The possibility to modify or cancel an order shall be subject to the proviso that MISUMI accepts this. MISUMI explicitly reserves the right to exceptions to the following rules at its own discretion, where, in exceptional cases, MISUMI cannot accept such cancellation due to the manner, type, quantity or shipment date of the products or the distribution system used. The customer will be informed accordingly without delay after receipt of the request for modification or cancellation of the order.

In general, orders may be cancelled free of charge, provided that such cancellation is received by MISUMI on the day the order confirmation was sent to the Customer. Precondition for the cancellation free of charge is, that MISUMI receives the cancellation in written form within 2 hours after the order confirmation was sent, latest one hour before MISUMI business closing hours (Monday to Thursday 17:00 h (CET), Friday 16:00 h (CET)). This means, that cancellation on work days Monday to Thursday has to be made latest until 16:00 h (CET) and on Fridays latest until 15:00 h (CET) within to hours. Cancellations later than 2 hours after the order confirmation was sent, respectively 1 hour before MISUMI business closing hours, will be charged with a cancellation fee amounting 50 % of the order value.

Cancellations later than on the day, when the order confirmation was sent to the Customer, may be cancelled depending on the delivery time of certain components and must be requested individually from the Customer Service.

To the extent that the order concerns products whose configuration and quantity is kept on stock by MISUMI, the order may in principle be cancelled free of charge up to one day prior to shipment, provided that MISUMI accepts such cancellation.

Notwithstanding the above provisions, special orders in accordance with items 1.7 and 3.13 of these GTCs as well as express orders may not be cancelled.

The cancellation fees are calculated from the order value (contract value including taxes, freight, etc. - see 5.1). The usual working days (Monday to Friday) at MISUMI in Schwalbach am Taunus, Germany, shall be relevant for the calculation of the above periods.

Any request for modification or cancellation of orders must be directed to the fax number or e-mail address indicated under item 15 of these GTCs quoting the order and customer identification number.

4.2.

Return of products already delivered

In principle, returned products will not be accepted back.

In exceptional cases, the customer may return products after prior consultation with and consent of MISUMI's after-sales service, to the extent that these products are so-called stocks within the meaning of item 1.8.

For products in line with 4.2 b), the customer will be charged a restocking fee amounting to 20 % of the order value. The customer shall also bear the costs for returning the products.

In principle, the return and re-acceptance of special orders pursuant to items 1.7 and 3.13 is excluded.

5. Prices and payment

5.1.

Prices are understood in Euros from MISUMI's place of business in Schwalbach am Taunus, plus applicable value-added tax, packaging, costs for shipment and, in case of export deliveries, plus customs duties and charges as well as other public fees. Prices are as listed at the time of the conclusion of the contract or upon sending the order confirmation, respectively. The required packaging is invoiced at cost price and will not be taken back by MISUMI. The customer shall bear the costs for shipment as well as any additional costs for overnight or express delivery effected at his request.

5.2.

All prices are based on the cost factors (exchange rates, raw material prices, wages, etc.) applicable at the date of conclusion of the contract. Should any major changes to the cost factors occur for which MISUMI is not responsible or culpable, MISUMI shall have the right to withdraw from the contract up to the agreed delivery date or to make a new offer to the customer.

5.3.

If the products are delivered to places outside the Federal Republic of Germany, the customer shall be obliged to pay the respectively applicable delivery charge laid out in MISUMI's current price list. The amount of the delivery charge depends on the country of destination to which the delivery shall be effected. MISUMI will announce its current delivery charges and inform the customer accordingly upon request. In the event that the price list does not state the delivery charges for the respective country or customer, MISUMI may request reimbursement of the delivery charges actually accrued.

5.4.

The costs for special orders pursuant to item 3.13 of these GTCs shall also become payable together with any further costs in accordance with item 5.1.

5.5.

Payment is deemed to have been effected only after MISUMI can definitely dispose of the amount. By accepting cheques, MISUMI does not assume any obligation with regard to the drawing up of protests against and timely presentation thereof. All expenses and other costs accruing in connection with the collection of cheques shall be borne by the customer.

5.6.

If the customer fails to meet his payment obligations or if there is a material deterioration in his financial situation, MISUMI shall be entitled to demand full payment of the remaining debt, even when it has already received cheques from the part of the customer. In this case, MISUMI shall also be entitled to request advance payment or the provision of securities and to refuse fulfilment of its obligations until the advance payment has been effected or the securities have been provided. If MISUMI's request is not fulfilled within a reasonable period of time, MISUMI shall have the right to withdraw from the contract and/or demand damages for non-performance. In the event of cessation of payments by or overindebtedness of the customer, there is no need for setting any extension. Furthermore, MISUMI shall have the right to withdraw from the contract if the customer fails to pay within a reasonable extension time or if an application for the commencement of insolvency proceedings is filed.

5.7.

Should the customer default on payment, he shall owe default interest amounting to 8 percentage points above the respectively applicable base interest rate.

5.8.

MISUMI may fix ceilings on the amounts for the purchase of products without advance payments or securities. In the event that the overall price of the products ordered by the customer reaches or exceeds this ceiling, MISUMI may at its sole discretion react as follows:

The customer may be requested to pay the amount due, in whole or in part, prior to the delivery of the products ordered.
MISUMI may refuse, revoke or cancel the order(s); and/or
take any other measures or actions (e.g. ask for securities) MISUMI shall deem necessary to safeguard its own interests.

At the customer's request, MISUMI will inform the latter on such maximum amount for the order.

6. Use of MISUMI products, administrative regulations

6.1.

MISUMI products are laid out to be used in general production equipment for automatic assembly machines, devices for machine processing, inspection equipment and devices, and plant automation machines. The customer shall inform MISUMI on any legal provisions and adminsitrative regulations with regard to the delivery, equipment or use of the products enquired or ordered for any other purposes. This duty to provide information shall include in particular any provisions regarding the nature and use of the products to be supplied, any safety regulations, decrees and specifications on prohibited substances, import regulations, etc. MISUMI shall take no responsibility in the event of an infringement of said duties to provide information. In this case, the customer undertakes to fully indemnify MISUMI for or against all claims for damages resulting thereof. MISUMI products are not suitable for the following range of uses so that, in principle, the company objects to the use of its products for the following types of equipment:

transportation equipment including trucks, ships, vessels, etc.
all types of medical devices or equipment;
all types of commercial goods that are or will be sold to customers (including prior sale);
aviation and aeronautics, aerospace equipment;
equipment for use in nuclear energy production;
military products (including weapons);
installation and use in public areas.

6.2.

Furthermore, it shall be prohibited to order any products purchased from MISUMI to be further processed to goods constituting an infringement against Council Regulation (EC) No. 428/2009 („EC Dual Use Regulation“) or against national or European obligations to obtain permits within the meaning of the lists of the German Federal Office of Economics and Export Control (BAFA) or national or international embargo decisions, or to use them in such way.

6.3.

In all other respects, all information listed in the catalog or in the printed or electronic overviews on the product range with regard to the products shall be observed; this shall include product specifications, the intended use of the products, conditions of use or drawings specifications as well as all information or descriptions in the written material sent with the products or accessories thereto.

6.4.

Warranted product characteristics shall only be deemed to be the suitability of the products for the purposes listed under 6.1 above within the scope of the technical specifications warranted by MISUMI or confirmed as warranted characteristics. MISUMI's liability shall be restricted to this extent. Any information contained in overviews on the product range or advertisements, either by MISUMI or by third parties shall not constitute any binding representation as to the characteristic features of MISUMI products. The granting of a guarantee or any covenant beyond MISUMI's technical specifications must be made in writing and requires the company's consent. A guarantee shall only be effectively agreed if it describes the contents, the term and the territory covered by such guarantee with sufficient precision. In accordance with item 6.5 below, MISUMI shall provide technical consultation as well as recommendations for the use or processing of products, whether by words, in writing or in the form of illustrations, to the best of its knowledge and belief and based on existing regulations and its experience.

6.5.

All details and information by MISUMI staff about the suitability and use of these products shall not be binding and shall not release the customer from carrying out his own tests and trials with regard to the suitability of the products for the intended procedures, uses, or applications. The use, application and processing of the products purchased from MISUMI are beyond MISUMI's control and thus solely in the responsibility of the customer. Verwendung, Anwendung und Verarbeitung der von MISUMI bezogenen Produkte erfolgen außerhalb der Kontrollmöglichkeiten von MISUMI und liegt daher ausschließlich im Verantwortungsbereich des Kunden.

6.6.

The specified product characteristics can only be warranted when the products are used and stored properly and according to the product specifications.

7. Delivery period and delivery

7.1.

The delivery period shall begin with the sending of the order confirmation, but not before submission of all documents, licenses, permits, approvals and authorizations to be provided by the customer, or before receipt of any agreed advance payment.

7.2.

It is a prerequisite for a tax-exempt delivery within the EU that the customer has notified a valid VAT identification number. Any entitlements the customer may possibly have for a VAT refund cannot be recognised if MISUMI did not have a valid VAT identification number when the order was placed (see also 2.1 and 3.4).

7.3.

A delivery date confirmed by us shall be deemed to have been met if the contractual item has left the factory or the MISUMI warehouse in Schwalbach am Taunus or when the customer has been notified about readiness for shipment.

7.4.

MISUMI shall not be liable for the inability to deliver or delays in delivery to the extent that these are caused by Acts of God or any other events that were unforeseeable at the date of conclusion of the contract (e.g. all forms of disruption in operations, difficulties in obtaining material and energy, delays caused by transit problems, strikes or lawful lockouts, shortage of labour, energy or raw materials, difficulties in obtaining the required administrative permits, administrative measures - also affecting our suppliers - as well as the non-timely delivery by the suppliers) when MISUMI has not caused and is not responsible for such circumstances. To the extent that these events considerably impair or make the delivery or performance impossible for MISUMI and if such impairment is not just temporary, MISUMI shall be entitled to rescind from the contract. If, due to the delay, the customer may no longer be reasonably expected to accept delivery or performance, he may withdraw from the contract giving prompt written notice thereof to MISUMI. In the event of temporary impairments, the delivery and performance periods shall be extended accordingly.

7.5.

MISUMI shall be entitled to effect partial deliveries so far as this is reasonable for the customer.

7.6.

If MISUMI defaults in delivery or performance or if delivery or performance become impossible, the liability for damages shall be limited in line with item 10 of the present GTCs.

7.7.

If the number of products delivered to the customer exceeds the number ordered by him, and if the responsibility therefore lies with MISUMI, the customer will inform MISUMI thereof within five working days after receipt of the delivery. MISUMI will collect any excess products at its own expense by commissioning a freight carrier. Until the products are collected by the freight carrier, the customer shall handle the products with due care. The customer's liability shall end when the excess products are handed over to the forwarder, carrier, or any other third party designated to perform the shipment.

8. Shipment and transfer of risk

8.1.

At the customer's choice, delivery will be effected ex works or ex warehouse if the customer takes over the products, or by shipping.

8.2.

If the product is taken over by the customer, the risk of loss or damage to the contractual item shall pass on to him; this shall also apply if the products are taken over by a freight carrier commissioned by the customer. In the event that the freight is transported by a carrier selected by MISUMI, the risk of loss or damage to the product is transferred to the customer at such point in time when the product is handed over to the forwarder, carrier, or any other third party designated by MISUMI to perform the shipment. The provisions in item 8.2 above shall also apply to partial deliveries.

8.3.

If the product is ready for shipment and the shipment or acceptance are delayed for reasons for which MISUMI is not responsible, the risk passes to the customer upon receipt of the advice of shipment.

8.4.

If it has been agreed that the delivery will be effected carriage paid, the customer shall bear any additional costs accruing if he has any special shipment requirements, if there is any delay in delivering the freight for which he is responsible, or if the freight must be delivered to him repeatedly for reasons for which he is responsible, or for any other complications with regard to the shipment.

8.5.

Notwithstanding any further rights pursuant to these GTCs, the products delivered have to be received and accepted by the customer even if they have slight defects.

9. Defects and warranty

9.1.

Irrespective of the type of shipment and the provisions on commercial transactions in accordance with sections 377 et seq. HGB (German Commercial Code) or the duty of notification in line with the present GTCs, the customer must inspect the products delivered without delay for integrity and have any damage thereto confirmed in writing by the forwarder, carrier, or any other third party or institution designated to perform the shipment. MISUMI must be notified without delay after detection of the defects about any transport damage which is noticed only after the products were unpacked. After receipt of the customer's notification, MISUMI shall have the right to have a third party inspect the notified damage. Any damage accruing to MISUMI due to a lack of or delay in notification shall be borne by the customer. If the notification of the defect is unjustified, the customer shall assume the costs incurred through the inspection and, if applicable, separate transport of the products.

9.2.

The product forming the subject of the complaint will be picked up at MISUMI's expense by a freight carrier commissioned by MISUMI. This shall not apply if there is an increase in the costs, because the products are located at another place than the one agreed.

9.3.

Any visible defects shall be deemed to be approved if no written notification about defects has been received within seven working days.

9.4.

In the event of a material defect of the product delivered, MISUMI may, at its discretion, remedy the defect either by subsequent improvement or delivery of a replacement. If such subsequent performance fails, the customer may either withdraw from the contract within a reasonable period of time or reduce the purchase price appropriately.

9.5.

The statute of limitations for defect claims by the customer shall be one year. It shall start when the product is handed over to the forwarder, carrier, or any other third party designated to perform the shipment or, at the latest, upon handing it over to the customer.

9.6.

Unless specified otherwise below, further claims on the part of the customer, on any legal grounds whatsoever, shall be excluded. MISUMI shall therefore not be liable for any damages beyond direct damages to the delivered product. In particular, MISUMI shall not be liable for any of the customer's lost profit or property damage. Furthermore, MISUMI's warranty obligation shall no longer apply:

when the customer modifies or repairs the product without MISUMI's prior written consent;

in the event of careless or improper handling or use of the product by the customer;

in the event of natural wear and tear of the product or such other circumstances for which MISUMI is not responsible;

if the customer does not allow MISUMI sufficient time or give MISUMI the opportunity to remedy defects or for a replacement delivery.

9.7.

If the defect is attributable to MISUMI, the customer may demand damages only under the preconditions laid out in item 10 below.

10. Limitation of liability

10.1.

Irrespective of the legal grounds thereof, MISUMI's liability for damages shall be limited in accordance with the present provisions.

10.2.

In case of slight negligence in performance, MISUMI shall only be liable for foreseeable, direct, average damages typical for the contract in consideration of the nature of the product. This shall also apply to slight negligence in performance on the part of MISUMI's legal representatives, entities, employees or other assistants. Furthermore, MISUMI's liability shall be excluded in the event of any negligent violations of minor contractual obligations.

10.3.

Any claims for damages on the part of the customer for defects in line with section 434 BGB (German Civil Code) as well as the legal consequences in line with section 437 no. 1 BGB shall expire one year after the product has been handed over to the forwarder, carrier, or any other third party designated to perform the shipment, or to the customer.

10.4.

Any restrictions in accordance with this item 10 shall not apply to MISUMI's liability for wilful or intentional behaviour, for warranted characteristic features, loss of life, physical injury or impairment of health, or under the German Product Liability Act (ProdHaftG).

11. Samples, trademarks and reproductions

11.1.

Any samples made available to the customer by MISUMI during, in the course of or prior to the conclusion of the contract are merely representative samples. No "purchase according to sample" or representations or assured qualities shall be agreed based on the provision of samples prior to or on the occasion of the conclusion of the contract. The provision of samples does not mean that any specific characteristics of the products are agreed.

11.2.

Reprints and any type of reproductions - in whole or in part - including but not limited to MISUMI brochures, catalogs, promotional materials, etc. shall only be permissible upon MISUMI's prior written consent.

11.3.

Without MISUMI's prior written consent, the customer may not use MISUMI's trademarks or use them on products or their packaging, or in the related printed matter and advertising material as information on the components. Furthermore, the customer may not refer to or promote his own products referring to MISUMI products or MISUMI trademarks.

12. Retention of title

12.1.

Until payment has been made in full in respect of all claims arising from the business relationship with the customer, MISUMI shall retain the title to the product or object of purchase.

12.2.

The customer undertakes to treat the objects purchased with care.

12.3.

In the case of attachments or other access by third parties to the retained goods (i.e. goods subject to retention of title), the customer shall inform MISUMI thereon without delay.

12.4.

The customer may further dispose of the products within the proper course of business. No further disposal shall be permitted, however, to end customers who have excluded or limited any assignments of claims for payment against them. Other dispositions, especially pledges or the creation of security interests with regard to the retained goods are not admissible without MISUMI's prior consent. The customer shall hereby assign to MISUMI any and all claims accruing to him from the resale of the retained goods against his buyers or to any third party in the amount of MISUMI's final invoice (including value-added tax) and MISUMI herewith accepts such assignment (extended retention of title). In the case of joint ownership of the retained goods, the assignment in advance shall be valid only for such part of the claim corresponding to MISUMI's joint ownership share (based on the amount of the invoice). The customer shall, until further notice, remain entitled to collect the claim also after the assignment. MISUMI's right to collect the claim shall not be affected thereby. However, MISUMI undertakes not to collect such claim as long as the customer fulfils his payment obligations, if he is not in default of payment and, in particular, if no application for the institution of insolvency proceedings has been filed and no cessation of payments has been declared. Should this however be the case, MISUMI may require the customer to inform the company about the assigned claims and their debtors, to provide all information needed for the collection thereof, to hand over all related documents, and to inform all debtors of such assignment.

12.5.

Processing or modification of the retained goods by the customer is always performed on behalf of MISUMI. If the object of purchase is processed by means of other objects not belonging to MISUMI, MISUMI shall acquire coownership in the new object in the ratio of the value of the object of purchase to the other processed objects at the moment of processing.

12.6.

If the object of purchase (retained goods) is inseparably mixed with other goods not belonging to MISUMI, then MISUMI acquires joint ownership of the new object in proportion to the invoice value of the object of purchase to the invoice value for such other object at the time of mixing. If the mixing is performed in such a way that the customer's object must be considered as principal object, it shall be understood and agreed that the customer assigns MISUMI a co-ownership in the appropriate ratio. The customer shall keep the sole ownership or co-ownership on goods generated in such way in safe custody on behalf of MISUMI.

12.7.

For the goods or co-ownership shares owned by MISUMI in line with items 12.5 and 12.6 above, the same shall be applicable as for the goods subject to retention of title.

12.8.

MISUMI undertakes to release the securities due to it at the customer's request to the extent that the value of the securities exceeds the value of the receivable accounts to be secured on behalf of MISUMI by more than 20 percent. MISUMI shall decide to release whichever parts of the securities it deems suitable.

12.9.

If the customer fails to fulfil his performance obligations, MISUMI shall be entitled to withdraw from the contract (enforcement event). MISUMI shall then be entitled to demand the return of the retained goods and to exploit them.

13. Privacy

MISUMI shall ensure confidential treatment of the data collected in accordance with the relevant statutory provisions on data protection of the Federal Republic of Germany as well as in line with MISUMI's privacy policy.

14. Place of performance, choice of law, jurisdiction

14.1.

The place of performance for ex works deliveries shall be the factory; for all other deliveries, the place of performance shall be MISUMI's place of business in Schwalbach am Taunus/Germany

14.2.

The law of the Federal Republic of Germany shall apply. The Convention relating to a Uniform Law on the International Sale of Goods of The Hague dated 01 July 1964 and the provisions of the UN Convention on Contracts for the International Sale of Goods dated 11 April 1980 shall not apply.

14.3.

The exclusive place of jurisdiction for all disputes arising out of or in connection with this contract shall be MISUMI's place of business in Schwalbach am Taunus/Germany. The same applies if the customer does not have a general place of jurisdiction in Germany or where the customer's place of business is not known at the time the complaint is filed. MISUMI shall also be entitled to sue the customer at the court of his place of residence.

15. Final provisions

15.1.

In the event that one or more provisions of these GTCs and of the further agreements concluded herein shall be, fully or partly, invalid or unenforceable or subsequently lose their validity or enforceability, the validity of the other provisions shall not be affected thereby. An invalid provision will be replaced by the contract parties with a provision which comes as close as possible to fulfilling the purpose which was intended with the invalid provisions. The same shall apply for a gap in the contract. Section 139 BGB (German Civil Code) shall not apply.

15.2.

MISUMI reserves the right to modify the General Terms and Conditions or a part thereof at any time. The respectively current version under www.misumieurope. com shall be observed.

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Company Profile

Corporate Name	MISUMI Group Inc.
Established	February 23, 1963
Head Office	Iidabashi First Bldg., 5-1, Koraku 2-chome,Bunkyo-ku,Tokyo
Fiscal Year	From April 1 through March 31
Description of Business	Development of Group management strategies, administration, and all functions related to Group management
URL	http://www.misumi.co.jp/

Warranty Standard

In this Warranty Standard, "the Company" means one of the overseas affiliated companies of MISUMI Corporation or MISUMI Group Inc. (Japan), whose distribution area includes the country where the principal place of business of the Customer (as defined in Article 1.1 of the Terms and Conditions of Sale separately set out in the Catalog (the "Terms and Conditions") is located.

All warranties on products (the "Products") purchased by the Customer from the Company that are listed in this catalog, including web based catalog (the "Catalog") are based on the Terms and Conditions and the following warranty provisions (this "Warranty"). Please note that this Warranty does not apply to special orders.
By purchasing or using the Products, the Customer is deemed to have agreed with this Warranty, regardless of any other warranty provisions the Customer may have with the Company regarding the Products.
Some of the Products come with a manufacturer guarantee certificate or warranty. In this case, please be aware that the manufacturer guarantee certificate or warranty will supersede this Warranty and this Warranty will not be applicable.

● Scope and Period of Warranty

1. With respect to the Products purchased by the Customer, the Company will replace all or part of the Products or repair the Products free of charge if it is deemed there is any damage, deformation or defects to the Products (the "Defects") that are attributable to the Company, on the condition that (i)written notification stating sufficient details of the Defects, satisfactory to the Company, reaches the Company within the warranty period (defined in the following clause), and (ii)the Company acknowledges the Defects are attributable to the Company.
   Provided, however, that the following cases are outside of the scope of the warranty.
   (1) Defects caused by use of the Products in any way other than as a part of general production equipment. In this case, general production equipment means automatic assembly machinery, machining jigs, inspection jigs, and factory automation machinery, but does not include transportation devices with the purpose of transporting humans such as automobiles, vehicles, or ships, medical equipment with the purpose of curing and diagnosing humans, or consumer goods that are used in general households such as electronic and electric equipment.
   (2) Defects caused by use of the Products in aerospace equipment, nuclear energy equipment, or military-related products such as weapons or arms.
   (3) Defects caused by recklessness or error in the Customer's handling of the Products.
   (4) Defects caused by natural disasters (including, without limitation, earthquakes, fires and floods)
   (5) Defects caused by failure to comply with the specifications, intended uses, instructions and warnings, conditions of use, drawings or other matters relating to the Products that are provided in the Catalog; or with any notice or other description in documentation that comes with the Products (or its accessories).
   (6) Defects caused by the Customer itself processing, repairing, modifying or disassembling the Products.
   (7) Defects caused by equipment other than the Products
   (8) Defects caused by use of the Products outside the country where the Company, from which the Customer purchased the Product, is located.
   (9) Defects caused by using the Products for untested or unanticipated purposes or in untested or unanticipated ways.
   (10) Defects caused by the Customer using the Products in violation of the provisions of the Terms and Conditions.
   (11) Any other cases in which the Company provides in the Catalog that it will not repair or replace the Products.
2. The warranty period applicable to the Products under this Warranty is one (1) year from the day the Company ships the Products.
3. Minor flaws such as scratches, marks, dents or discoloration that do not make the Products unusable do not constitute Defects. Provided, however, that if the Company acknowledges any flaws such as scratches, marks, dents or discoloration to be particularly significant, such flaws will constitute a Defect.
4. Within one(1) week of receipt of the Products the Customer shall confirm the name and quantity of the Products, check that the specifications of the Products match those listed in the Catalog and that there are no Defects in the Products. If there is any Defect, the Customer must give written notification to the Company, from which the Customer purchased the Products, within one week. Please note that the Company may deem that the Products have no Defects under warranty if it does not receive notice within one(1) week of receipt of the Products.
5. The Customer will be charged for all replacements and repairs of the Products that take place after the warranty period, that are outside the scope of warranty, or are otherwise not subject to this Warranty.
   In certain cases, repair or replacement may not be possible due to the nature, production date or specification of the Products.

● Disclaimer

1. Other than as expressly provided in the Terms and the Conditions and this Warranty, or otherwise stipulated by applicable product liability laws, the Company will not be liable in any way for any damages(regardless of whether such damages are direct or indirect, or general or special), losses or expenses arising in relation to Defects of the Products. Damages arising in relation to Defects of the Products include damages caused by Defects in manufactured goods using the Products, damages caused by recall of the Products or any manufactured goods using the Products and damages arising from inability to use the Products include damages caused by a suspension of any production line in the Customer's factories or production facilities.
2. The maximum liability of the Company for damages arising out of or in connection with Defects of the Product shall be limited to the actual amount paid by the Company to the Customer for the Products in Defects. In no event shall the Company be liable for any special, consequential or tort damages of any kind, including, but not limited to, damages resulting from any loss of profits.
3. In case the company is not the manufacturer of the products or otherwise does not fall within the scope of applicable product liability laws, the Customer will seek damages under such product liability laws from the manufacturer of the products.
4. In particular, the Company will not be liable for any damages arising out of or in connection with any of the following cases.
   (1) Use of the Products by the Customer in violation of precautionary notices, warnings or any other provision contained in Terms and Conditions, Catalogs, manufacturer guarantee certificate or warranty
   (2) Defects in the Product caused by the willful misconduct or negligence of the Customer
   (3) Defects in the Products caused by force majeure
   (4) Infringement of any patent rights, utility model rights, design rights, trademark rights or other intellectual property rights of a third party arising in relation to the Products
   (5) Exportation of the Products or delays in or prohibition of exportation of the Products due to laws or ordinances, or regulations

● Terms of Use

1. This Warranty only applies to the purchase and use of the Products within the country where the Company provides the Products to the Customer, and is not applicable outside of such country.
2. Under this Warranty, the Company may request the Customer return the products that need to be repaired or replaced to the Company. Please be aware that the Company cannot send employees to the Customer to repair or replace the Products.
3. Production and sale of the Products may be suspended at the discretion of the original manufacturer. Please be aware that in this case it will not be possible to replace the Product with the exact same product.

The Company may revise, modify or amend this Warranty ("Amendments") and will set forth such Amendments in the Catalog or on the website of the Company. If the Customer orders the Products after such Amendments, the Customer will be deemed to have approved such Amendments.

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